A NEW

# FAMILY ENCYCLOPEDIA;

OR

# COMPENDIUM

OF

# UNIVERSAL KNOWLEDGE:

COMPREHENDING

A PLAIN AND PRACTICAL VIEW OF THOSE SUBJECTS MOST INTERESTING TO PERSONS IN THE ORDINARY PROFESSIONS OF LIFE.

ILLUSTRATED BY NUMEROUS ENGRAVINGS.

FIFTH EIDTION.

EDITED

BY CHARLES A. GOODRICH.

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# PREFACE TO THE SECOND EDITION.

THE FIRST Edition of the following work, having met with a more flattering reception among its patrons, than the most sanguine hopes of the Editor allowed him to anticipate, he has been encouraged to attempt several improvements in this edition.

In making these improvements, the Editor has endeavored to render the plan of the work more simple—has erased such portions as appeared devoid of interest, or utility, and substituted therefor more than sixty pages, original matter, on topics which, it is believed, will be found important in the view of those for whose benefit the work is designed.

It has been the object of the Editor, from the first, to proceed upon the principle of *selection* and *utility*—to embrace so few subjects, as to enable him to enlarge upon them, according to their relative importance; and to treat of them in so *plain* and *practical* a manner, as to render the work *intelligible* and *useful*. By this means, he has been enabled, he trusts, in a measure, to avoid a serious ojection which has sometimes been made to the portable Encyclopedias extant, that they embrace so great a variety of articles, as to render them little more than Dictionaries. A different course has been here adopted, and it gives the Editor pleasure to know that it has the sanction of a large portion of his patrons.

To the friends who have aided him and lightened his task, he takes occasion to renew the expression of his thanks, especially to the author of the article on Horticulture. In respect to that article, the editor is reqested to say, that it is chiefly an abridgement of Cobbett's excellent system of gardening. And in relation to several other parts of the work, he can claim no other merit than that of presenting to his readers a condensed and faithful *compilation*.

The nature of the work has precluded him, in many instances, from giving credit to the several authors, of whose labors he has availed himself.

It belongs to this place, therefore, to express his obligation to Guy's Pocket Encyclopedia, Edinburgh Encyclopedia, Mitchel's Pocket Encyclopedia, Library of Useful Knowledge, Library of Entertaining Knowledge, Godman's Natural History, Goldsmith's Natural History, Hooper's Medical Dictionary, Family Physician, American Farmer, New England Farmer, Complete Grazier, Loudon's Encyclopedia of Agriculture, Clater's, Hind's, and Mason's Farming, White on the Diseases of Cattle, Bigelow's Technology, Allen's Mechanics, Tegg's Book of Utility, American Almanac, &c. &c.

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# FAMILY ENCYCLOPEDIA,

OR

# COMPENDIUM OF UNIVERSAL KNOWLEDGE.

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## PART I.

### MAN.

A KNOWLEDGE of the various objects of *nature* and art, is doubtless worthy of the attainment of every one. An acquaintance with these objects contributes to enlarge the mind—to gratify a rational curiosity—to excite admiring views of the Great Author of all things, and to prepare for a wider sphere of usefulness. Yet, it cannot be denied, that a knowledge of *oneself* is of higher importance still. Without self-knowledge, man must be ignorant of the true dignity of his nature, and lost to just views of the divine wisdom and goodness, displayed in his composition.

Man, it has been well observed, is a compound existence, made up of two great parts; the *Body*, and the *Mind*, or *Soul*. The body was formed of the dust: but it is a frame of a most wonderful nature. The parts of which it is composed—their number—their various uses,—dependencies and operations,—the arrangement, by which they are formed into a system,—the faculties attached to it, as seeing, hearing, smelling, tasting and feeling—its capacity of pleasure and pain—the warnings which it is fitted to give of approaching or commencing evil—and the power which it so variously possesses of self-restoration, are *all* wonderful, mysterious, and strongly declaratory of the skill and benevolence of the Creator.

But the *Mind* or *Soul* is of a still more wonderful nature. It is this, which emphatically gives man his pre-eminence over other beings, by which he is surrounded; and entitles him to be considered as the "lord of the creation." To the faculties of the body there is a limit; but to the immortal mind God has never said, "Thus far shalt thou go, but no further." Much as man knows, in any stage of his progress, he may know still more; and may become still more exalted and lovely. Not confined to the present system, as are other animals, he is destined to an existence, which, in point of duration, will run parallel with that of his Maker.

It will, therefore, naturally belong to the first part of our work to take a view of man, considered as to his animal and intellectual nature.

## SECTION I.

### NATURAL HISTORY, STRUCTURE, &C.

VARIETIES.—The human family is divided into different nations, which are scattered abroad upon the face of the earth, and exhibit several varieties of form and color. These divisions are five in number: the *European*, or *white race*—the *Tartar*, or *Mongul*—the *Malay*—the *African*, or *Negro race*—and the *American*, or *copper colored race.*

1st. The *European* race is distinguished by the elegance of its form, and by a forehead more or less broad and prominent; indicative of a considerable portion of brain, in the front part of the skull; the skin is, however, fairer; the hair and eyes lighter in color, in the more temperate climates, than towards the south. This race includes all the inhabitants of Europe, (Except the Laplanders and Finns,) and the descendants of Europeans in America, and other portions of the world. It also embraces the inhabitants of the western temperate parts of Asia, as far as the river Oby, the Caspian Sea, and the Ganges, and those of the northern parts of Africa, viz. the people of Barbary, Egypt, and Abyssinia, and the Moors of Northern Africa.

2d. The *Tartar*, or *Mongul* race, is characterized by a yellow skin; straight black hair; square heads; large and flat face; small and flat nose: round and prominent cheeks; and pointed chin. This variety includes all the nations in Asia east of the Oby, Caspian, and Ganges, excepting Malacca. It embraces, also, the tribes which inhabit the frigid zones in both the eastern and western continents, including the Laplanders, Samoiedes, Ostiacs, Tunguses, Yakuts, Tschutskis, and Kamtschadales of Siberia, and the Esquimaux and Greenlanders.

3d. The *Malay* comprehends the inhabitants of the peninsula of Malacca, Ceylon, the Asiatic islands, New Zealand and Polynesia, with the exception of New Holland, New Guinea, New Caledonia, and Van Dieman's Land. This variety is characterized by a tawny color; black curled hair, which is soft, thick, and abundant; a prominent forehead; thick, wide, and flattened nose; and moderately projecting upper jaws.

4th. The *African*, or *Negro* variety, is spread over western and southern Africa. It is found, also, upon the coast of Madagascar, and occupies New Holland, Van Dieman's Land, New Caledonia, and New Guinea. This variety is characterized by a black color; black and woolly hair; thick lips; projecting cheek bones; large and flat nose; raised chin; retreating forehead; and crooked legs.

5th. The *American*, or copper colored race, includes all the aboriginal inhabitants of both the Americas, excepting the Esquimaux, and Greenlanders. This race is of a copper color, resembling that of rusty ron or cinnamon; coarse, straight, black hair; high cheek bones; and

sunken eyes. The forehead is usually short; the nose and the whole countenance broad; the nostrils open; and the lips thick. The beard is thin and scanty. Of the Indians it has been affirmed, that they are destitute of beards; but this only occurs when the beard has been eradicated, at the expense of much industry and suffering.

INTELLECTUAL CAPACITY. Of all the varieties of mankind, there can be no doubt that the *white man* exhibits the greatest marks of ingenuity and intelligence; and of this variety the most intelligent will be found to be those who reside in temperate climates. Portions of the *Mongul* race exhibit also considerable ingenuity, evinced particularly in the *Hindoo* and the *Chinese;* but the range of intellect of this portion of our race, is nevertheless comparatively circumscribed. The third, or *Malay* race, exhibits no small variety of intellectual endowment. While none of the tribes which belong to this race, equal the Chinese and some others of the Mongul race, few, perhaps, are so sunken as some portions of the Negro race. This last race exhibits much animal power, yet it is far beneath the white man in intellectual capacity; we see the Negro in the Hottentot at its lowest grade. The *copper colored man*, we may be certain is also far beneath the European in his intellectual capacity, although he is not deficient in many fine traits of character.

DIFFERENCE OF STATURE, FORM, AND COMPLEXION. Three causes, a writer remarks, may be regarded as concurring in the production of those varieties which we find attached to the different nations of the globe. *First*, the influence of climate; *second*, food, which has a dependance on climate; and *third*, manners, on which climate has perhaps, a still greater influence.

The *heat* of the climate is the chief cause of blackness among the human species. When this heat is excessive, as in Guinea, we find the people are perfectly black; when a little less severe, the blackness is not so deep; when it becomes nearly temperate, as in Barbary, the Mogul empire, and Arabia, the men are only brown; and when it is altogether temperate, as in many parts of Europe, Asia, and America, the men are white. Some varieties are, indeed, produced by the mode of living; all the Tartars, for example, are tawny, while Europeans, who live under the same latitude, are white. This difference may safely be ascribed to the Tartars being always exposed to the open air; to their having no cities and fixed habitations; to their sleeping constantly on the ground; and to their rough and savage manner of living. These circumstances are sufficient, at least, to render the Tartars more swarthy than the Europeans, who want nothing to make life easy and agreeable.—Why are the Chinese fairer than the Tartars, though they resemble them in every feature? Because they are more polished, live in towns, and practise every art to guard themselves against the injuries of the weather; while the Tartars are perpetually exposed to the action of the sun and air.

When the *cold* becomes extreme, it appears to produce effects similar to those of great heat. The Samoiedes, the Laplanders, and the natives of Greenland are tawny. Here the two extremes approach each other; great heat and great cold produce similar effects on the skin, because each of these causes acts by a quality common to both—the dryness of

the air, perhaps, is equally great in extreme cold, as in extreme heat. Both cold and heat dry the skin, and give it that tawny hue which we find in so many different nations. Cold contracts all the productions of nature; the Laplanders, accordingly, who are perpetually exposed to the rigors of the frost, are the smallest of the human species.

The most temperate climates produce most handsome people, and from this climate, the ideas of the genuine color of mankind, and of the various degrees of beauty, ought to be derived.

Although the climate may be regarded as the chief cause of the different colors of men, yet food greatly affects the form of our bodies; that which is unwholesome and ill prepared, makes the human species degenerate. All those people who live miserably are ugly and ill made. The air and soil have considerable influence upon the figure of men, beasts, and plants. In the same province, the inhabitants of the elevated and hilly parts, are more active, nimble, handsome, and ingenious, than those who live in plains, where the air is thick and less pure.

Every circumstance concurs in proving that mankind are not composed of species essentially different from each other; that on the contrary, there was originally but one species; who, after multiplying and spreading over the whole surface of the earth, have undergone various changes by the influence of climate, food, mode of living, epidemic diseases, and the mixture of dissimilar individuals; that at first, these changes were not so conspicuous, and produced only individual varieties, which afterwards became specific, because they were rendered more general, more strongly marked, and more permanent, by the continual action of the same causes; and that they have been transmitted from generation to generation, as deformities or diseases pass from parents to children.

ORIGIN OF NORTH AMERICAN INDIANS.—This is a subject which has justly attracted the attention of philosophers, and produced many interesting researches. It would obviously be impossible, within our narrow limits, to give our readers any correct idea of the various theories which have been adopted, to account for the peopling of America by the Indians. The received opinion, we believe, and that which seems to be supported by *facts*, is, that the aborigines of America emigrated to America from the continent of Asia.

The principal objections which have been urged against this doctrine, so far as we know, are the two following; 1st, that many thousand years must have elapsed subsequent to the creation, before the population of the old world could have been sufficiently numerous to extend to its remote borders, and thence attain the American continent. Besides, it is thought to reflect upon the wisdom of the Deity, to permit so large a part of the globe to remain during "so long a time" unpeopled.

The second objection is drawn from the number of different languages spoken in North and South America, which Mr. Jefferson and others have thought incompatible with the idea of so recent an arrival on this continent as even three or four thousand years.

In respect to the *first* objection, it were sufficient to reply, that it assumes a position, which needs itself to be proved, and can therefore nev-

er be the basis of solid argument. On this subject, Dr. Godman, in his Natural History, observes; "There is neither extravagance nor impropriety in the opinion, that the two continents were originally one, and being continuous, the only difficulty is removed that could be urged against the approach of population from the extremity of Asia. But in addition to all the reasons that can be urged in support of the doctrine we maintain it should not be forgotten, that there are strong evidences derived from astronomical and geological observations, proving the axis and poles of our globe to be not now precisely where they originally stood. It is therefore very unfair to decide against the probability of peopling America from the extremity of Asia, if we reason from the existing climate of the countries adjacent to East Cape, or Cape Prince of Wales, the two nearest points of Asia and America.

"The greatest difficulty thrown in the way of this opinion, was thought to be the striking difference between the Esquimaux and the common Indians, seeming to prove that they were derived from different races or kinds. We are informed in Crantz's History of Greenland, near the Moravian Missionaries, who visited the countries inhabited by the Esquimaux, were much surprised to find that they were in all respects similar to the Greenlanders, and made use of the same language; shewing that the Esquimaux had sprung from the same race, and had gradually reached their present residence from the extreme northern parts of Europe. This fact, now rendered undeniable by more recent researches, entirely invalidates the conclusion that the Esquimaux were derived from another species. The resemblance existing between these people and the Siberians, Kamtschadales, Tunguse, &c. is manifest; and notwithstanding they differ in many respects from other inhabitants of the New World, they are undeniably descended from the same parent stock, coming from different parts of the globe. The copper colored natives of America, who are the most numerous of the aborigines, approach more closely to the Asiatic Tartars, in color and stature, and this, because they are descendants of that race arriving in America from the extremity of Asia."

In respect to the *second* objection, the same writer observes: "Granting, as we are perfectly willing to do, the great lapse of time, which would be requisite for the production of such radical changes, we do not think the objection derived from the languages, more solid than those heretofore mentioned. As far as the researches of philologers have extended, we do not find that there is so much difference in the dialects of our aborigines, as the arguments of these objectors would seem to imply. Throughout a large mass of this native population, a very perceptible connexion of language is apparent, and the relation to a parent stock, is fairly evident. Even allowing that the amount of difference is as great as could be desired by our opponents, the comparison of the aboriginal dialects with those of European nations, is by no means a correct mode of deciding the point. If, according to our idea, people reached this country at different times, from the extreme north of Europe, or the northeast of Asia, the immense extent of country they were gradually to be scattered over, the new objects by which they were surrounded, and the new modes of life they assumed, would *all conspire* to produce a change in their language in a much shorter time than could take place on the old continent, where their wanderings must have been

not only comparatively circumscribed, but their modes of living subject to very few variations.

"But in the present condition of our knowledge, we have no right to state that the traces of affinity between the American dialects *are entirely obliterated*; it would be far more correct to say, that we do not possess the means of making the necessary inquiries and decisions; our knowledge of their language is confined to a few meagre vocabularies, frequently derived from persons whose statements cannot be relied on however correct their intentions may have been, to say nothing of the almost insuperable difficulty of writing such languages from the hearer's idea of their pronunciation.

"But whatever apparent difficulties may be suggested to the Asiatic origin of the aboriginals of America, the circumstance of but *one species* of the human race existing throughout the world, is sufficient to reduce us to the necessity of acknowledging that mankind have descended from one parent stock, however their external appearance may have been modified by accident, disease, or situation. We are aware that some persons talk of the possibility of there having been *various centers of creation* to the human race, as among inferior animals; but we consider it very unphilosophical to suppose the existence of various centres of *creation* for the same *species*." To the believer in Divine Revelation, this last idea, whatever may be thought of it in a philosophical view, will doubtless appear repugnant to the scripture account of the origin of the human species, and is therefore to be rejected.

HUMAN STRUCTURE.—The animal frame is composed of bones, muscles, brain, nerves, arteries, veins, cartilages, membranes, glands—also of chyle, blood, milk, &c.

BONES are white, hard, brittle, and almost insensible; they support and form the stature of the body, defend its viscera, and give power to the various muscles. The number of bones in the human body is generally 240; but in some individuals, who have two additional bones in each thumb and great toe, they amount to 248.

TEETH, a set of bones, situated in the upper and lower jaws, for the purpose of mastication. In adults, they are 32 in number, or 16 in each jaw-bone, consisting of 4 cutting, 2 canine, and 10 grinders.

The teeth are of various sizes, being arranged in the following order; *four* in front, termed cutting teeth, on each side of which, is a sharp pointed canine or *eye tooth*; adjoining to these are *five* grinders on each side, the last of which, is denominated the *tooth of wisdom*, because it seldom appears before the 25th year. The front and eye teeth are furnished with only one root each; the two first grinders with two; and the hindermost, generally with three or four; which may, in most persons, be ascertained by the number of small tubercles on the crowns. The tooth is divided into two principal parts; viz: the *crown*, which projects above the gums; and the *root* that is enclosed within the sockets. The crown is a hard, fine, glossy, white *enamel*, serving to defend the substance against external injury. The root is open at the bottom, where it is connected with vessels and nerves, by which it receives nourishment, life and sensation.

MUSCLES, of which, it is said, there are 446 in the human body, dissectible and describable, are parts of the animal body, destined to move some other parts, and hence are termed the organs or instruments of motion. They are composed of flesh and tendinous fibres, and contain vessels of all kinds.

FLESH is the fibrous or muscular part of the animal body; muscular flesh is composed of a great number of fibres or threads; it is commonly of a reddish or whitish color. The ancients distinguished five different kinds of flesh: but the moderns admit one only, *fleshy* and *muscular* parts being with them the same.

SKIN is the general covering of the body. Though apparently a simple membrane, it consists of several parts. The outermost is the *scarf-skin;* it has no nerves, and is extended over every part of the true skin, except where the nails are; it is this skin which is raised by the application of a blister; it is thickest in those parts accustomed to labor or pressure, as the hand and foot. The *rete mucosum* is a web-like mucous substance, lying between the scarf and true skin, which chiefly gives the color to the exterior of the human body. It is black in the negro; white, brown, or yellowish, in the European. The *true skin* is a very sensible membrane, extended over all parts of the body, and nerves terminating so plentifully on its surface, that the finest needle cannot prick it without touching some of them.

ABSORBENTS are a set of small colorless vessels, which pervade the whole surface of the body both externally and internally. Their office is to take up whatever fluids are effused into the different cavities, and to pour out their contents for particular uses. For the purpose of absorption, they are highly irritable at their extremities, and are very replete with valves, to prevent the escape or return of their contents. Their number, when compared with other vessels, is four times greater; and they are divided into *lymphatics* and *lacteals*, according to their respective offices, the former conveying lymph, the latter chyle.

CARTILAGES, or gristles, are smooth, solid, flexible, elastic parts, softer than bone, and seem to be of the same nature: some even become bones by time; some again are much softer, and partake of the nature of ligaments. They terminate those bones that form moveable joints, and in some instances serve to connect bones together. In the nose, ears, and eyelids, are cartilages.

A MEMBRANE is a thin, white, flexible, expanded skin, formed of several sorts of fibres, interwoven together. The use of membranes is to cover and wrap up the parts of the body; to strengthen them, and save them from external injuries: to preserve the natural heat; to join one part to another; to sustain small vessels, &c.

A GLAND is an organic part of the body, destined for the secretion or alteration of some peculiar fluid, and composed of blood vessels, nerves, and absorbents. The glands are designated either according to the particular fluids which they contain, as mucous, sebaceous, lymphatic, salival, and lachrymal glands; or their structure, as simple, compound, conglobate, and conglomerate glands. The vessels and nerves of glands always come from the neighboring parts, and the ar-

teries appear to possess a higher degree of irritability. Glands appear to the eye as whitish membranous masses.

The BRAIN consists of the whole of that mass which, with its surrounding membranes and vessels, fills the greater part of the skull. It is said to be larger in man, in proportion to the nerves belonging to it, than in any other animal. It consists of the *cerebrum*, *cerebellum*, *tuber annulare*, and *medulla oblongata;* the whole weighs usually about forty eight or fifty ounces; but its weight varies in different subjects.

The CEREBRUM, which is by far the largest portion, is contained in all the upper parts of the skull; it is divided into a right and left hemisphere by a membrane termed *falx*. Each hemisphere is also again subdivided into three lobes, the two lying in the front portion of the skull being the largest. It is surrounded with membranes, and accompanied with blood vessels.

The CEREBELLUM, or *little brain*, is situated in the back part of the skull beneath the posterior lobes of the cerebrum, from which it is separated by a membrane called the *tentorium*. It is divided by the *falx minor* into two hemispheres, which are again subdivided into lobules.

The *tuber annulare* is of a roundish form, about an inch in length and of the same width. From the tuber annulare arises the *medulla oblongata*, which forms the beginning of the spinal marrow.

From the brain arise *nine pairs* of NERVES; some in solid cords, others in separate threads which afterwards unite into cords. Of these some have their origin in the *cerebrum*, some in the *cerebellum*, some in the *tuber annulare*, and some in the *medulla oblongata*. From these the nerves supplying the organs of *smell*, *sight*, *taste*, *hearing*, and *feeling*, in part, are derived. The nerves are called pairs, not because they proceed together from the brain and spinal marrow, but because they proceed from the opposite lobes of the brain, or from opposite sides of the spinal marrow, and supply similar parts on each side of the body with nerves. And hence it often happens in paralysis, or palsy, that on one side of the body all the nerves perform their office imperfectly, while on the other side no diminution of nervous energy is evinced. A nerve is a long white medullary cord. The uses of the nerves are to convey impressions to the brain, from all parts of the body, over which they are spread, and to impart motion, by exciting the muscles, to the whole system. It is the opinion of some philosophers, that the nerves contain a subtle fluid, by means of which impressions are immediately carried to the brain; this fluid has, however, never been seen; others think that sensation is produced by what has been termed vibration; but the plain truth is, we are at present ignorant of the means by which sensation and muscular motion are produced, further than that we know both are the effect of the agency of the nerves.

The SPINAL MARROW, or *medulla spinalis*, is a continuation of the *medulla oblongata* from the head through the centre of the spine, which consists of a series of bones called *vertebræ*, supporting the body. From the spinal marrow are given out *thirty pairs* of nerves; these, in conjunction with those arising from the brain, communicate energy and feeling to the whole body; and also by their extreme sensibility

convey to the brain, the mind or soul, the slightest as well as the strongest impressions made upon the different organs; hence, our *pleasures*, and our *pains*, our *hopes*, our *fears*, and our *affections*.

That the *brain*, as a whole, is the organ of thought, the seat of the understanding, and the place where the emotions of the mind or soul arise, we cannot doubt; it is also the centre of *sensation* and *muscular motion*, and to which all the nerves of the body appear subservient. But to what other particular *uses* the different parts of the brain are applied, does not yet appear accurately known.

*Phrenologists* have pretended to throw some light on this curious and interesting subject. We shall confer a favor on our readers, we trust, by making them acquainted with some of the results of their investigation.

The founder of the system of phrenology—by which is meant, "the science which treats of the faculties of the human mind, and of the organs by which they manifest themselves,"—is Dr. Gall, a physician of Vienna, who, about the year 1796, first began to deliver lectures on the subject. In 1804, Dr. J. G. Spurzheim became associated with him. Under the auspices and captivating eloquence of these gentlemen, the system has acquired some credit in several parts of Europe.

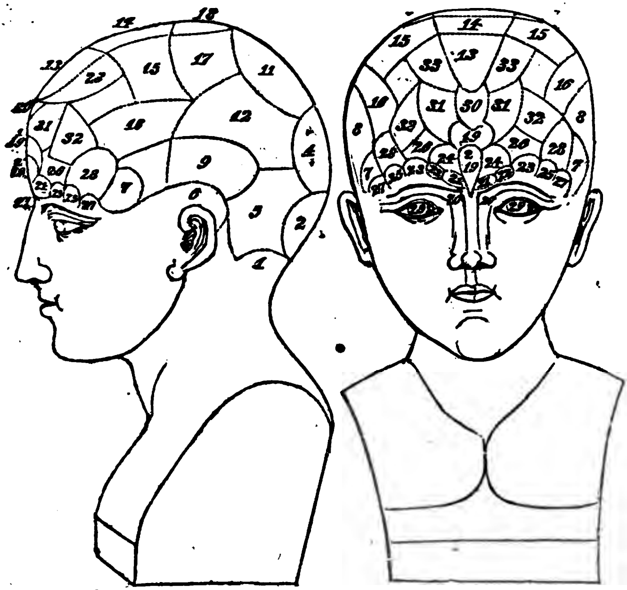
For ourselves, we give little credit to it. Its tendency is obviously towards the gloomy and foolish doctrine of materialism. In one respect—in regard to the position, and size of the brain—there is truth in phrenology; but, of the particular *mapping* of the skull, as adopted by the phrenologists, we think it behooves us, at present, to remain in modest doubt.

Still, as a subject of curiosity, it is not without interest. And in order that our readers may judge, in respect to themselves, what is the strength of *their* intellectual powers, or to what propensities they are most inclined, we have engaged our engraver to execute the outlines of a human head, *skilfully* and *scientifically divided* up, or *mapped* out, in the language of the science. The reader will notice that in each division is supposed to lie some faculty or propensity of the mind. By an inspection of the brain itself or the living man's head, the phrenologists affect to determine what facility or propensity predominates—whether a man is gifted with a love of study, or inclined to idleness—whether he is peaceful or quarrelsome—timid or courageous—a wise man, or a fool. We leave our readers to apply the subjoined rules for themselves.

The numbers which follow, refer to the numbers to be found in the maps of the heads on the following page.

1. Here lies the propensity of *amativeness* or *physical love*. 2. Here the propensity of *philo-progenitiveness*, or love of children. 3. *Concentrativeness*, or power of close study, (not represented.) 4. *Adhesiveness*, or disposition to friendship. 5. *Combativeness*, or quarrelsomeness. 6. *Destructiveness*, or desire to destroy and murder. 7. *Constructiveness*, or mechanical skill. 8. *Acquisitiveness*, disposition to avarice, theft, &c. 9. *Secretiveness*, cunning, deceit. 10. *Self-esteem*, on the top of the head, (not represented.) 11. *Love of approbation*, in the same vicinity. 12. *Cautiousness*. 13. *Benevolence*. 14. *Veneration*. 15. *Hope*. 16. *Idealty*, or love of the sublime. Fine arts. 17. *Wonder*. 18. *Consci-*

*entiousness*. 19. *Firmness*. 20. *Individuality*, love of philosophy. 21. *Form*, or power of imitating. 22. *Size*, ability to judge of it. 23. *Weight of resistance*, power to judge of the momentum of bodies. 24. *Coloring*, ability to distinguish between nice shades. 25. *Locality*, desire for travelling. 26. *Order*, desire to see every thing in its place. 27. *Time*, recollection of dates. 28. *Number*, the conception of number, and its relations. 29. *Tune*, the perception of melody, (not represented.) 30. *Language*, faculty of acquiring language easily. 31. *Comparison*, power of perceiving resemblances. 32. *Causality*, genius for metaphysics. 33. *Wit*, disposition to view objects in a ludicrous light.



The THORAX or Chest, consists of the upper portion of the trunk of the human body; it is inclosed by the ribs, having the *sternum* or breast bone in the front, and a portion of the bones of the back behind. It is separated from the liver, stomach, intestines, &c., by the *diaphragm*, or midriff. The thorax contains the lungs, heart, &c., and numerous blood vessels, nerves, and absorbents. It is also separated by a membrane called *mediastinum*, into a right and left portion.

The RESPIRATION is that action of the lungs and diaphragm consisting of the process of inspiration and expiration, by which air is received into, and expelled from the thorax or chest. The quantity of air taken into the lungs at each natural inspiration, is supposed to be about 15 or 16 cubic inches; the number of respirations made in a minute is about 20.

WINDPIPE.—LUNGS.—HEART.

The **WINDPIPE** is a cartilaginous and membranous canal, through which the air passes into and from the lungs. It is divided by anatomists into three parts,—the *larynx*, the *trachea*, and the *bronchia*.

The *larynx* is a hollow cartilaginous organ, at the top of the trachea. The air which passes through it during respiration, produces the voice.

The *trachea* is that portion of the wind pipe which extends from th larynx to the *bronchia*.

The *bronchia* is a term given to the trachea after it has entered the thorax, or chest; here it separates into two branches, one of which communicates with the right, and the other with the left lung.

The **LUNGS** are two viscera situated in the thorax, by means of which we breathe. The lung in the right cavity of the chest is divided into three, that in the left cavity into two lobes. They hang in the chest, attached at their superior part by means of the trachea, and are separated by a membrane called *mediastinum*. They are furnished with innumerable cells which are formed by a continuation of the trachea, the bronchial tubes of which communicate with each other; the whole appears not unlike a honey comb.

The most important use of the lungs is for the process of respiration, by which the circulation of the blood appears to be immediately supported; and, doubtless, by their alternate inflation and collapsing, they contribute, with the diaphragm, to promote the various functions of the abdominal viscera, such as digestion, &c. For the change which the blood undergoes in its passage through the lungs, see the following articles.

The **HEART** is a hollow, strong, muscular viscus, having the shape of a cone or pyramid reversed. Its size varies in different subjects; it is generally about six inches long, and, at the base, four or five wide.

The younger the subject, the larger is the heart, in proportion to the body. It is often smaller in tall and strong men, than in others. It is situated on the left side of the thorax, and is surrounded by a membrane called *pericardium* or *heart purse*; it is also imbedded, as it were, in the left lung. Its weight, with the pericardium, is usually from ten to fifteen ounces. It is the centre of the circulation of the blood; of course, from it all the *arteries* arise, and in it all the *veins* terminate. It is divided internally into a right and left *ventricle*; these are divided by a fleshy *septum*. Each ventricle has two orifices; one auricular, through which the blood enters, the other arterious, through which the blood passes out. These four orifices are supplied with valves. There are also two cavities adhering to the base of the heart, called *auricles*. The heart has, in the living subject, an alternate motion, consisting of contraction and dilatation, called *systole* and *diastole*, by means of which the blood is circulated throughout the body. The heart is said to contract 4000 times in an hour; hence, as each ventricle contains one ounce of blood, there passes through the heart every hour, 4000 ounces, or 350 pounds of blood. The whole mass of blood is about twenty-eight pounds, so that this quantity of blood passes through the heart thirteen or fourteen times in an hour, or about once in every four or five minutes. In the whale, ten or twelve gallons of blood are thrown out of the heart

at a stroke with an immense velocity, through a tube of a foot diameter.

An ARTERY, or a pulsating blood vessel, is a cylindrical canal, conveying the blood immediately from the heart to all parts of the body, for the purposes of nutrition, preservation of life, generation of heat and the secretion of different fluids. The motion of the blood in the arteries is called the *pulse:* it corresponds with that of the heart. The pulse may be felt in various parts of the body, but the most usual place of feeling it is at the wrist. From seventy to eighty pulsations in a minute are commonly the number which in the adult subject is considered, as far as the pulse is concerned, to constitute health. In children, however, the pulse is much quicker than this; and in old persons slower. Wounds in arteries are always dangerous, and very frequently mortal; hence the wisdom evinced in the structure of man; all the arteries are deeply imbedded in flesh, or other surrounding media, while the veins, a wound in which is comparatively unimportant are plentifully scattered on the surface of the body. The blood in the arteries is of a florid red color.

A VEIN is a blood vessel, which returns the blood from the various parts of the body to the heart. The veins do not pulsate; the blood flows through them very slowly, and is conveyed to the heart by the contractility of their coats, the pressure of the blood from the arteries, the action of the muscles, and respiration; and it is prevented from going backwards in the veins by *valves*, of which there are a great number. The blood in the veins is of a much darker red than that in the arteries.

Before we treat of the blood itself, it may be useful to know the component parts of atmospheric air, so essential to the life of all warm blooded animals.

AIR was for many ages considered as a simple homogeneous fluid; and it was not till towards the end of the last century that it was found to be a compound body. Common air is composed chiefly of two gases, of which one, *oxygen* forms of it 24 parts by weight, and the other, *nitrogen* forms of it 76 parts, or about 21 parts of the former, and 79 of the latter by bulk. These proportions are found the same, in whatever part of the world the experiments are made, or from whatever height in the atmosphere the air is obtained. It ought, however, to be mentioned, that besides these ingredients, common air contains a very minute portion of *carbonic acid gas*, but that portion is in general so small as not indeed to be considered of any moment. Of the two portions of atmospheric air, the *oxygen* only supports animal life or combustion. Thus, if an animal be enclosed under a bell glass containing atmospherical air, it will live in it till all the oxygen is absorbed by its breathing, and then it instantly dies; the same takes place when a lighted candle is enclosed under similar circumstances; hence the necessity and importance of this fluid to animal existence. But although only about one fourth of atmospheric air can support life, it yet appears that such a mixture is more advantageous for animal life than oxygen alone; thus evincing the wisdom of that mixture found every where as atmospheric air. In what state of combination the two gases are, which constitute common air, is not exactly known; but we well know that a more

intimate union of the same materials produces most powerful agents namely the *nitrous* and the *nitric* acids.

The BLOOD is a red fluid of a saltish taste, of a somewhat urinous smell, and glutinous consistence, which circulates in the heart, arteries, and veins, conveying nutrition, heat and excitement to the whole body. The quantity of blood in the human body is estimated to be about twenty-eight pounds in an adult. Of this, four parts are contained in the veins, and a fifth in the arteries. The blood being returned by the *veins*, of a dark red color to the heart, is sent from that viscus into the lungs, to undergo some material change by coming in contact with atmospheric air, in the air-cells of the lungs; after which, as has been stated, it is returned to the heart again, of a much more florid color, and then impelled into the arteries, to be distributed over the body. The heat of the blood is usually about 98 degrees.

THORACIC DUCT, an important vessel, called the trunk of the absorbants. It is of a serpentine form, and about the diameter of a crow-quill. It is attached to the bones of the back, and extends from the lower opening of the *midriff* or *diaphragm* (a membrane which separates the heart and lungs from the stomach, bowels, and other abdominal viscera,) to the angle formed by the union of the left subclavian and jugular veins, into which it opens and evacuates its contents, there to be mixed with the blood. These contents consist chiefly of *chyle*, a whitish or milky fluid, separated from the food by the process of digestion, and taken up by the absorbents thickly spread over the intestines, and by them conveyed to the thoracic duct.

Such are the offices of respiration and the blood. We shall now proceed to consider some of the most important of the abdominal viscera.

The ABDOMEN consists of all that portion of the trunk of the human body, situated below the thorax. It contains the liver, its gall-bladder, the stomach, the spleen, the pancreas, the intestines, the mesentery, the kidneys, the urinary bladder, the omentum, &c. It has also numerous blood vessels, nerves and absorbents.

The LIVER, which is the largest and most ponderous viscus in the abdomen, it weighing in adults about three pounds, is of a deep red color. It consists of a glandulous mass, interspersed with numerous blood vessels. It is situated under the diaphragm, inclining to the right side of the body, having the stomach beneath it; between which, and the liver itself, lies the *gall-bladder*, with which it is of course intimately connected. It is divided into two principal lobes, the right of which is by far the largest. Its shape approaches that of a circle; it is attached to the diaphragm by the suspensary and other ligaments. It is larger in young animals than in old ones.

The BILE is of a yellow-green color, about the consistence of thin oil; when much agitated, it froths like soap and water. Its smell is somewhat like musk; its taste is bitter. It is, in fact a species of soap; and like other soap, is successfully employed to remove grease from clothes, &c. The *gall-bladder* in the human body is shaped like a pear, and is generally capable of containing about an ounce. It is firmly connected to the liver. In the elephant, stag, all insects and worms, this

reservoir is wanting, the bile which they secrete passing at once into the intestinal canal. The real use of the bile does not even now seem to be accurately ascertained. It appears, however, to assist in separating the *chyle* from the *chyme*, to excite the intestines to action, and to produce the healthy appearance of intestine evacuations.

The SPLEEN, or MILT, is a spongy viscus of a livid color, in form somewhat resembling a tongue, but its shape, situation and size, vary very much. It is, in a healthy subject, always on the left side, between the false ribs and the stomach. Its general length is six inches, breadth three and one thick. It is connected by the blood vessels to the stomach and the left kidney. It is larger when the stomach is empty, and smaller when compressed or evacuated by a full stomach. The uses of the spleen, have, till lately, been considered as unknown; but by a paper of Sir E. HOME, in the Philosophical Transactions, it appears probable that this viscus is a reservoir for the superabundant serum, lymph, globules, soluble mucus, and coloring matter carried into the circulation, immediately after digestion is completed.

The STOMACH is a large receptacle, varying in its capacity from about five to eleven pints. It is situated under the left side of the diaphragm, its left side touching the spleen, and its right covered by the thin edge of the liver; its figure nearly resembling the pouch of a bagpipe, its left edge being most capacious. The upper side is concave; the lower is convex. It has two orifices, both on its upper part; the left through which the aliment passes from the mouth through the *gullet* or *œsophagus* to the stomach, is named *cardia;* the right, through which it is conveyed out of tne stomach into the *duodenum*, is named *pylorus*, where there is a circular valve which hinders the return of the aliment from the gut, but does not at all times hinder the bile from flowing into the stomach. The stomach, like the intestine canal, is composed of three coats or membranes.

The uses of the stomach are to excite hunger, and partly, thirst; to receive the food from the œsophagus, and to retain it, till, by the motion of the stomach, and the admixture of various fluids, and by many other changes not exactly understood, it is rendered fit to pass the right orifice of the stomach, and afford chyle to the intestines for the nutrition of the body; or, in other words, till the important process

Of DIGESTION is completed. The chief agent in this process, is beyond question, the *gastric juice:* a fluid that is secreted from certain glands in the stomach, and which possesses great solvent powers in regard to numerous animal and vegetable substances. The food being duly masticated, and blended with a considerable portion of saliva, is propelled into the stomach, where it soon undergoes a remarkable change, being converted into a pulpy mass, termed *chyme:* the chyme afterwards passes from the stomach into the small intestines; here, it is mixed with bile, and separated into two portions, one of which is as white as milk, and called *chyle;* the other passes on to the larger intestines, and is voided as excrementitious matter. The chyle is absorbed by the *lacteals*, which terminate in the trunk or tube called *thoracic duct:* it is there, mixed with variable proportions of lymph, and, lastly, with the blood, as stated under that article.

GASTRIC JUICE.—PANCREAS.—INTESTINES.—KIDNEYS.

The GASTRIC JUICE is said to be of so powerful a nature, that after death the stomach is occasionally eaten into holes by its action. And it is also said, that if exposed to a proper temperature, it will digest food in metal tubes.

The PANCREAS, or SWEET-BREAD, is a large gland of the salivary kind, of a long figure, compared to a dog's tongue. It lies across the upper and back part of the abdomen, under the stomach. Its use is to secrete a juice called the pancreatic juice, which appears to be similar in its properties to saliva, and, together with the bile, helps to complete the digestion of the aliment. It communicates with the duodenum.

The INTESTINES consist of that convoluted tube beginning at the right orifice of the stomach, called *pylorus*, and ending with the *sphincter recti*. The length of this canal is generally six times the length of the whole human subject. It is divided by nature into two parts. The *small intestines* begin from the stomach, and fill the middle or fore part of the abdomen; the *large intestines* occupy the sides, and both the upper and lower parts of the same cavity.

The KIDNEYS are shaped like a kidney-bean. They are situated on the lower part of the back, one on each side. They are generally surrounded with more or less fat.

The SENSES are those faculties or powers by which external objects are perceived. The *sight*, *touch* or feeling, *hearing*, *smell* and *taste*, are called the *senses*. The organs through which they operate are the following:—

The EYE is the organ of *seeing*. The eye-lids, the eye-lashes, and the eye-brows, require no particular description. The eye-ball is of a globular figure; it is composed of various membranes; but those parts of the eye deserving the most notice, are the *iris*, the *pupil*, and the *retina*. The iris is that colored circular ring, situated beneath the *crystalline lens*, which surrounds the central or dark part called the *pupil*.

It is capable of expanding or contracting, which it constantly does, according to the quantity of light which is thrown upon the eye. In a very bright light the pupil is reduced by the contraction of the iris to a very narrow hole; in a dark place the pupil is so much enlarged, as to render the iris scarcely visible. The *pupil* is the dark round opening in the middle of the eye, surrounded by the iris, and through which the rays of light pass to the *retina*, which is the true organ of vision, and is formed by an expansion of the pulp of the optic nerve. Externally, the globe of the eye, and the transparent *cornea* are moistened by a fluid called the *tears*, which are secreted in the lachrymal glands, one of which is situated above each inner corner of the eye. In proportion as the eye is more or less round, is the sight of a person longer or shorter. Persons of short sight are called *myopes*, of long sight, *presbyopes*.

TOUCH OR FEELING, resides in every part of the body that is supplied with nerves. The sense of touch is most exquisite in the lips, the tops of the fingers, the tongue, and a few other places.

The EAR is the organ of *hearing*. In man it consists of an external ear, or auricula, and an internal bony cavity, with numerous circular and winding passages, by which the vibrations of the air are collected and

concentrated, and by a peculiar mechanism conveyed to the auditory nerves. The ear is supplied with peculiar glands, which secrete an unctuous substance, called the wax of the ear. The external auditory passage proceeds in a spiral direction to the *tympanum* or drum of the ear, which forms a complete partition between this passage and the internal cavities. Beyond the tympanum is a hemispherical cavity which leads to the *fauces*, or opening at the back of the mouth: this opening is of a trumpet form. The inner cavity, including the winding passage, is aptly called the *labyrinth* of the ear. The *sense of hearing* is perhaps still more important than that of *seeing;* but as we can have no just conception of the real state of social existence without either of these senses, it is idle to speculate on such comparisons.

The NOSE is in man, and most of the superior animals, the organ of *smelling*. The structure of the nose has nothing in it so very peculiar that can convey any idea of a mechanical organization to aid the *sense of smelling.* It is true, the nerves of the nose are considerably expanded over the nostrils, and are defended from external injuries by a peculiar mucus; but it is very difficult to ascertain what are the essential organs of smelling. The *nostrils* are two passages of the nose which communicate interiorly with the upper part of the mouth. The use of the nostrils is for smelling, respiration and speech. The nose is an important part of the human countenance; it is considered in almost all countries as one of the features to which peculiar merit is attached.

The TASTE resides chiefly in the *tongue*, in conjunction with the palate, lips, and other parts of the mouth. The tongue is however destined to perform much more varied and important functions than that of conveying to the mind the taste of sapid bodies. It is the tongue, in conjunction with the lips, teeth, palate and throat, which produce the sounds of *language.* The tongue is partly muscular, and partly composed of membranes and cellular substance. Its upper side is covered with *papillæ*, in which the taste more immediately resides. The impression of sapid bodies on the organs of taste is modified by age, size, habit, and the more or less frequent application of strong stimulants. The state of the stomach, as well as general health, it often indicated by the state and color of the tongue. In health the tongue is always of a red color; in disease it varies from white to yellow, and sometimes is almost black. In health the tongue is always more or less moist; in disease frequently parched and dry; this last condition is, however, produced in health by the mere absence of moisture, evinced by the sensation we call *thirst.*

The SEXES differ by obvious indications; but there are some not so universally recognized, which we may mention. The male is generally of a larger size than the female, and more robust; the male becomes frequently bald on the top of the head, the female rarely or never; the male has always more or less *beard*, the female rarely any, except as old age approaches, and then it is chiefly confined to the upper lip. The anatomical differences, besides the obvious ones, are, in the female, a larger pelvis than in the male, more delicate muscles and smaller bones; and the phrenologists say, that the female skull is more elongated than the male, from the protuberance in the middle of the

back part of the skull, (which they denominate *philoprogenitiveness*, or love of children,) being more prominent. The mental differences of the two sexes are also important; women appear to possess more imagination and less judgment than men; these differences are unfortunately too often widened by mistakes in the education of the female mind.

## SECTION II.

### ON THE MIND AND ITS FACULTIES.

The term MIND has been lately applied by philosophers, to the *intellectual* portion of man, as being a more correct term than either *soul* or *understanding*. It implies that part of our being which is occupied in *thought*. The seat of the mind is manifestly the brain: but in what part of it, whether the whole, or in the pineal gland, as Des Cartes maintains, where he says all the nerves terminate; or whether, as Sommering states, the fluid contained in the ventricles of the brain be its seat, is unknown: all such opinions being mere conjectures.

The mind, or soul, has been usually divided into a certain number of *faculties*. We shall consider it from its more simple to its more complex state. The commonest and simplest impression made upon the mind, being conveyed to it by either of the senses, is called

SENSATION. Sensation is either pleasurable or painful; in proportion to the *degree* of pleasure or of pain produced by a sensation, will be the vividness of its apprehension by the mind. An apprehended sensation is termed PERCEPTION: that is, when the mind itself perceives, recognizes the sensation,—when it becomes the subject of thought in the mind, it is then called *perception*. An IDEA is a resemblance or image of any thing, which, though not seen, is conceived,—apprehended by the mind;—an idea appears to be, therefore, nothing more than a well-defined and apprehended perception. An idea may be simple or complex, true or false. Simple ideas are those which arise in the mind from sensation; as those of color by the eye, of sounds by the ear, heat by the touch, &c.; some ideas are formed by sensation and reflection jointly, as pleasure, pain, power, existence. Complex ideas are infinite; some are not supposed to exist by themselves, but are considered as dependencies on, or affections of substantives, as triangle, gratitude, murder, &c. Combinations of simple ideas are such as, a dozen, a score, beauty, theft, &c. The association of ideas, and consequently of affections, is one of the most important characters of the human mind, and the great source of our happiness or misery.

In tracing the process of the human mind in acquiring knowledge, we observe the following curious analogies or gradations; it commences with a simple idea or thought impressed, which is connected with simple perception. This solicits attention, which, according to its degrees of importance, disposes to observation, consideration, investiga-

tion, contemplation, meditation, reflection. These voluntary operations of the mind are necessary to the formation of clear conceptions, right understanding, an enlarged comprehension of some subjects, nice discernment, and accurate discriminations concerning others: these acquisitions enable us to abstract essential qualities in our minds from the subjects in which they are seated, to assemble others in new combinations, to reason, to draw inferences, and, finally, to judge or decide on their merits or defects.

MEMORY is that quality of the mind by which it is enabled to call up, generally at will, and upon suitable occasions, ideas, trains of thought which have been previously impressed upon it. No intellectual process can be carried on without memory: where the memory is weak, there the intellect will be found weak; where the memory is good, there, in general, will the intellect be powerful. In nothing, however, do individuals differ more from each other, than in their memories. Some remember one kind of facts and things well, while others remember them very indifferently. This has been attributed by the phrenologists to the activity and size of particular organs in the brain; and it seems to us probable that there may be some truth in this,—indeed the phrenologists assign to the memory many organs of the brain, such as those of *form*, *size*, *weight*, *color*, *space*, *order*, *time*, *number*, *tune*, *language*. But whatever truth there may be in this, we believe that more depends upon the *exercise of the mind* in any given course, than on the original conformation: that, in order to make the memory efficient, it must be often exercised on any given subject; and that the most important knowledge, if not occasionally revived by repetition, will frequently vanish from the mind. The notion of the mind being a store-house, and that ideas once deposited there, will always there remain, is extremely fallacious. It is true, they frequently do so, especially those received in youth; but many of these, without repetition, become in time obliterated. Hence, therefore, the necessity of not only the processes of education to improve the memory, but of an occasional repetition of them, in order that they may be efficient and useful to us in after life.

*Recollection* is that part of the memory, which consists in calling up in the mind the knowledge which has been previously impressed upon it. *Attention* and *repetition* help much to fix ideas in the memory; the ideas which make the most lasting impressions are those accompanied by pleasure or pain.

The powers of memory of some persons for particular subjects are astonishingly great. Seneca says that he was able, by the mere effort of his natural memory, to repeat two thousand words upon once hearing them, each in its order, though they had no connexion with each other. He also mentions that Portius Latro retained in his memory all the declamations which he had ever spoken, and never found his memory fail in a single word. Cyneas, ambassador to the Romans from king Pyrrhus, had, in one day, so well learned the names of his spectators, that on the next he saluted the whole senate and all the populace assembled, each by his name. Pliny says, Cyrus knew every soldier in his army by name, and L. Scipio, all the people of Rome. Carneades would repeat any volume found in the libraries as readily as if he were reading. Many

modern instances of the great powers of memory might be also adduced, but they do not appear necessary.

IMAGINATION is that particular state or disposition of the mind by which it is enabled to form numberless new and extraordinary ideas, which are not the immediate result of external impressions or of recollection, and hence is obviously distinguished from perception and memory. By the imagination, an individual creates thoughts entirely his own, and which never might have existed, had they not occurred to the individual mind. The exercise of most of the other qualities of the mind, requires calmness and composure. The imagination delights in the most heterogeneous and incoherent combinations, and most extravagant circumstances. These visions or phantoms are nevertheless sometimes impressed upon the memory, and during imperfect or disturbed sleep present themselves, and produce those absurd combinations which occur in *dreaming*. Although the flights of imagination are bold, yet they conform in some degree to the impressions which real objects have made upon the *sensorium*. And hence all the ideas which it calls up, have some relation to prior received facts, and to the knowledge acquired by the mind.

*Fancy*, *conceits*, and *phantoms*, are merely species, of which the imagination is the genus. *Poets* and *painters* are notoriously the subjects, in which a powerful imagination is essential to the effectual developements of their respective arts.

GENIUS is, in numerous instances, allied to the imagination. It consists in that natural talent, disposition, or aptitude, which one man possesses of performing some thing in preference to another, with peculiar facility and excellence. Thus men are said to have a *genius* for painting, poetry, music, &c.; meaning, that the powers of their minds enable them to excel in those particular departments. Although, perhaps, minute attention to the genius of each individual, is not, in a social and moral view, necessary in the education of youth, we believe, nevertheless, that some attention to this subject is absolutely necessary, in order to effectuate the best developement of the character. And while we cannot avoid admiring genius, we ought never to forget that its best exemplification is when combined with moral, useful, and virtuous actions; that true genius, real science, and rational religion, ought to be inseparable companions.

REASON; that process of the mind by which different ideas or things are compared, their fitness or unfitness perceived, and conclusions drawn from such comparisons and perceptions. *Judgment* is a similar operation of the mind; but, as its name imports, it is that act of the mind by which it concludes and determines upon certain final results. Thus we compare the sun and the moon, and finding the sun greater than the moon we determine or judge accordingly.

The WILL is a state or disposition of the mind, consisting in being disposed, *willing*, to do or avoid any act, or to obtain or avoid any thing. The state or disposition of the mind, called the *will*, is produced by innumerable agencies. Some of them arise from the internal feeling of the mind itself; others from external objects, as heat, light, cold, human society; our affections, our hopes, our fears, our pleasures and our pains;

others from an association of internal feeling with external objects; and hence the incalculable varieties of human actions.

GHOST; a spirit or apparition of some deceased person. The ancients supposed every man had three different ghosts, which, after the dissolution of the body, were variously disposed of. They were distinguished into *manes*, *spiritus*, *umbra;* the manes they supposed, went to the infernal regions; the spiritus ascended to the skies; and the umbra hovered about the tomb, as unwilling to quit its old connexions. The superstitious notions of ghosts, spirits, &c., are rapidly declining; and notwithstanding all the solemn tales which have been propagated, there is no reason to believe that any real spirits or celestial agents have held intercourse with man since the establishment of Christianity. The history, therefore, of modern miracles, appearances of the dead, &c., will be always found, when thoroughly examined, merely the phantoms of a disordered imagination.

In quitting this subject, it may be observed, that when the mind turns inward, *thinking* is the first operation that occurs; and in this we may observe a great variety of modifications, and whence it frames to itself distinct ideas. Thus, the perception annexed to any impression on the body by an external object, is called *sensation.* When an idea occurs without the presence of the object, it is called *remembrance;* when sought for by the mind, and brought again to review this process, it is called *recollection;* when the ideas are attempted to be registered in the memory, it is *attention;* and when the mind considers any subject in a variety of views, successively dwelling upon each, it is called *study.*

KNOWLEDGE, therefore, from this short view of the mind, it will be seen, arises from those impressions and ideas which we receive by the medium of the senses. We can have no knowledge further than we have ideas. A man may be said to *know* all those truths which are lodged in his memory by a previous, clear and full perception. In intuitive knowledge, the mind perceives the truth as the eye does light; thus the mind perceives that white is not black, and that three are more than two. This part of knowledge is irresistible, and on intuition depends all the certainty of our other knowledge. When the mind is obliged to discover the agreement or disagreement of our ideas by the intervention of other ideas, this is what is called *reasoning.*

Again. Knowledge includes, of course, all which we can know. It has been also divided into useful and luxurious knowledge. The best knowledge is that which enables us to act most virtuously, because virtue is the foundation of genuine happiness. *Learning*, properly so called, is not essential to a virtuous life, although considerable knowledge most undoubtedly is so; for ignorance is, in innumerable instances, the parent of error and of crime. A prudent *choice* in our pursuit of knowledge is, however, necessary, in order that we may avoid an idle and useless or pernicious waste of time.

The PASSIONS. In the proper management of the Passions consists mostly human wisdom. As every effort of the memory or imagination arouses some associate passion or affection, the mind rarely continues long in a quiescent state; that is, entirely divested of every

thing sensible, and unconscious of any particular feeling. It is by observing such associate feelings, that we are enabled to ascertain the nature and operation of the passions (or suffering) of the mind, and discover three distinct modes or states of passion, which differ from simple feeling only in duration and intensity, but not in quality. The state called *passion* is violent and transitory; *emotion* is less so; and *affection* is the least violent and most permanent. Hence we distinguish between the lowest and highest degree of feeling by the terms passion, emotion, and affection, which are always employed to express the sensible effects of objects or ideas concerning them on the mind. The word *passion*, therefore, is strictly and properly used to designate the first feeling, impression, or percussion, as it were, of which the mind is conscious from some impulsive cause; by which it is wholly acted on without any effort of its own, either to solicit or escape the impression. This passion or state of absolute passiveness, in consequence of any sudden percussion of mind, is necessarily of short duration. The strong impression immediately produces a reaction correspondent to its nature, either to appropriate and enjoy, or avoid and repel the exciting cause. This reaction is very significantly denominated *emotion*, which is applicable to the sensible effects produced on the mind in consequence of a particular agitation. Emotions, then, although often erroneously used as synonymous with, are only the effects of passions.

The term AFFECTION always implies a less violent, and generally more durable influence, which persons and things have on the mind. It is usually associated with ideas of good, but there exists no necessary connexion. Hence we find that the term passion is applicable to all the violent impressions made on our minds by the perception of something very striking and apparently interesting: emotion, to the external marks of visible changes produced by the force of the passion on the corporeal system; and affection, to the less violent, more deliberate, and more permanent impressions, by causes which appear sufficiently interesting. The range of affection may extend from those stronger feelings, which border upon emotions, to the mildest sensations of pleasure or displeasure, which we can possibly perceive. In like manner the *desire* of any thing under the appearance of its goodness, suitableness, or necessity to our happiness, constitutes the passion of *love:* the desire of avoiding any thing hurtful or destructive constitutes *hatred* or *aversion:* the desire of a good which appears probable, and in our power, constitutes *hope;* but, if the good appear improbable, or impossible, it constitutes *fear* or *despair*. The unexpected gratification of desire is *joy*: the desire of happiness to another under pain or suffering is *compassion;* and the desire of another's punishment, according to this hypothesis, is *revenge* or *malice*.

The desire of happiness is, then, it appears, the spring or motive of all our passions. Some wise and reasonable motive seems certainly necessary to all wise and reasonable actions. To act without a motive, would be the same as not to act at all; that is, such an action would answer no further or better end than not acting; but whatever wise ends are intended by the passions, if they are not kept under due regulation and restraint, they soon become the sources of our misery. Authors have arranged the passions into grateful and ungrateful, primi-

tive and derivative, &c.; but the simplest classification is into the *selfish* and the *social*, according to the exciting cause; in the former, the idea of good predominates; in the latter that of evil. The only emotions, which cannot be considered as connected either with the selfish or social feeling, with self-love or apprehension, are *surprise*, *astonishment*, and *wonder:* these are excited by something novel, embarrassing, or vast and incomprehensible in the object, without any reference to its peculiar nature; and, exerting their influence indiscriminately in passions of the most opposite characters, are aptly denominated introductory emotions. The passions and affections founded on self-love, and excited by the idea of good, are joy, cheerfulness, mirth, contentment; pride, vanity, haughtiness, arrogance, &c.; desires inordinate, as gluttony, drunkenness, lust, &c.; avarice, rapaciousness, emulation, ambition, and hope. The passions and affections operating on the principle of self-love, in which the idea of evil is immediately present to the mind, are sorrow, grief, melancholy, discontent, vexation, &c. The virtuous affections inspired by sorrow, are patience, resignation, humility, and fear, terror, despair, remorse, cowardice, doubt, shame, &c. Fortitude, courage, intrepidity, are virtuous affections, excited only by exposure to those evils, which are usually productive of fear; to which they are diametrically opposite. To this class also belong anger, resentment, indignation, and peevishness, fortitude, courage, and intrepidity, are likewise influenced by anger, with which they are always more or less blended.

The passions and affections derived from the social feeling, which extends its regards to the state, conduct, and character of others, and their relative circumstances, deportment, merit and dispositions, as contrasted with ourselves, may be classed under the cardinal affections of love and hatred, in which the idea of good or evil is predominant. The benevolent desires and dispositions appear in the parental, filial, fraternal, conjugal, and friendly affections.

*Sympathy*, is that inward feeling, which is excited by the situation of another, or which harmonizes with the condition and feelings of its object; in this manner it may become a passion, an affection, or a disposition. Sympathy indicates a susceptible mind, and impels men to plunge into water, or rush into flames, to succor a fellow creature. The sympathetic affections are very numerous, and discriminated by various appellations. They may be considered as they respect distress, such as compassion, mercy, commiseration, condolence, pity, generosity, liberality, charity, and condescension: as they relate to prosperity, in the sensations of joy, gladness, happiness, &c., at the good fortune of others; and as they proceed from sympathetic imitation, or affections derived from good opinion, such as gratitude, thankfulness, admiration, esteem, respect, veneration, awe, reverence, with the deviations of fondness and partiality. The passions occasioned by displacency, in which evil is the predominant idea, are of two kinds; those in which malevolent dispositions are indicated, and those of simple disapprobation without any mixture of malevolence. Those arising from malevolent dispositions are hatred, envy, rancor, cruelty, &c.; anger, rage, revenge, resentment, and jealousy. The displacency occasioned by unfavorable opinions gives rise to horror, indignation, contempt, disdain, and irrision. The five grateful passions, as they have been call-

ed, of love, desire, hope, joy, and pleasing recollection, enhance each other; so do the five ungrateful ones of hatred, aversion, fear, grief, and displeasure.

As happiness and misery, virtue and vice, depend almost entirely on the proper exercise of the passions and affections, the study of their nature and influence should become a distinct and primary branch of education. *Virtue*, therefore, consists not only in an exemplary desire of regulating all our thoughts and pursuits by right principles, but also, by so *acting* as to produce beneficial results to others as well as to ourselves. *Vice* is distinguished by unhappy effects, by conduct and propensities opposed to those of virtue, and consists in depraved affections and ungoverned passions. *Religion* is evinced by a laudable desire of rectitude, of yielding obedience to the divine command, and habitual solicitude to obtain the divine favor. *Devotion* is the religious temper or disposition applied to prayers and meditations which deeply interest the affections. *Superstition* is a consecrated self interest, without either love or regard to the supposed duties it enjoins, or to its object. He who imagines that the divine favor is to be gained by a strict attention to frivolous ceremonies, is superstitious. A tenacious reverence for unimportant sentiments, with a sour disposition towards those whose opinions are opposite, constitutes *bigotry*. An incessant desire to propagate some particular sentiment, or principle, to make proselytes, from whatever motive, is called *zeal*. The decided ascendancy of some particular object in the mind is denominated a *passion*, as a passion for music, &c. When this predilection occupies all our thoughts, and incites us to the most vigorous exertions, with such an ardor and constancy as to brave all difficulties, it is termed *enthusiasm*. Even our motives form various species of desire, which characterize the prevailing disposition; such as integrity, fidelity, loyalty, honesty, industry, honor, &c.; or treachery, treason, fraud, artifice, deceit, cruelty, &c.; according as they are influenced by worthy or unworthy dispositions. An invincible predilection to some one thing, opinion or sentiment, extreme contempt for all other kinds of knowledge, and an obstinate opposition of private opinion as the only counterpoise to public sentiment, without any regard to the weight of evidence on either side, are the invariable features of *fanaticism*.

# PART II.

## ALIMENTS.

Aliments are those materials, from which the different orders of created beings derive their nourishment. To most animals, nature has assigned but a limited range of aliment; but to man an extensive choice has been allotted. The vegetable and animal kingdoms, fruits, grains, roots, and herbs, flesh, fish, and fowl, all contribute to his sustenance.

ALIMENTS.

It is an interesting inquiry, How aliments so diversified in structure, and sensible qualities, become assimilated in one system, and contribute to our support? To this question it may be answered, that all organized beings, animal as well as vegetable, are composed principally of *carbon*, *hydrogen*, *oxygen*, *nitrogen*, *lime*, *sulphur*, and *phosphorus*. Different combinations of these elements make up the whole of their material systems.

Now, then, as the human frame is composed of the above materials, its daily waste must be supplied, by substances which yield these materials. These are to be found in various animal and vegetable substances, used by man as food. This food, when masticated, is received into the stomach, where it is exposed to the action of the gastric fluid, a powerful solvent of animal and vegetable matters. Here, it soon undergoes an important change, being reduced to a soft and similar mass, called *chyme*. From the stomach, the digested chyme passes into the intestines; where, subjected to the action of the bile, the pancreatic and mucous secretions, it undergoes still further changes; the result of all which is the formation and separation of a bland, white, milky fluid, called *chyle*. The chyle is sucked up by numerous vessels, called absorbent lacteals, to whose orifices it is every where exposed, in passing through the intestinal canal. These absorbents, after numerous communications, terminate in one common trunk, by which the chyle is mixed with the blood, and subjected to the action of the heart and arteries. Circulated now through the lungs, it undergoes new changes, from the respiration of the atmosphere;—it is incorporated with the common circulating mass, and becomes itself blood, the fountain from which all the other constituent parts of the body are formed, and renewed.

Such is a concise account of the manner by which animal and vegetable substances contribute to the support of the human frame—a process, though complex, taken in all its parts, yet easily understood; and when understood, eminently calculated to draw forth admiration, in view of the wisdom of God.

The gastric fluid of man is capable of digesting a great variety of animal and vegetable matters. And the structure of his body, his instinct and experience, clearly indicate, that his Maker designed him to derive his aliment from both the animal and vegetable kingdoms.

We say from *both*, for it is obvious that neither is suited to form the whole of our daily aliment. Animal food is more nutritious; but, from its heating and stimulating nature, when exclusively used; it exhausts and debilitates the system, which it at first invigorates and supports. And it is matter of observation and experience, that those persons who confine themselves to *animal* diet, become heavy and indolent; the tone and excitability of their frame are impaired; they are afflicted with indigestion and numerous other infirmities.

On the other hand, vegetables are acescent, and less stimulating; they are, also, less nourishing, and of more difficult assimilation, than food derived from the animal kingdom. A pure vegetable diet seems insufficient to raise the human system to all the strength and vigor of which it is capable.

Some eastern nations, indeed, and thousands of individuals of every

nation live almost entirely on vegetable aliment. But these, it is remarked, are seldom so robust, so active, so brave, as men who live on a mixed diet of animal and vegetable food.

In truth, a mixed diet of animal and vegetable food, it is believed, is best suited to the nature and condition of man. The proportions in which these should be used, we shall not attempt to settle. But generally, the quantity of vegetable food should exceed. Indeed, it is doubtful whether sedentary men should ever use animal food, more than *once a day*. Inhabitants of warmer climates require less than those of higher latitudes, and the sedentary of every climate less than those who labor.

All the products of vegetation are far from being equally nutritious. Some, indeed, instead of being alimentary, are highly noxious to animal life. The wax, resins, and balsams, the astringent, bitter, and narcotic principles are often used medicinally; but never as food, and those vegetables which abound in these, cannot, with safety, be used as aliments.

The alimentary principles of vegetation are *gum*, or *mucilage*, *starch*, *glutten*, *jelly*, *fixed oil*, *sugar*, and *acids;* and the different vegetables, and parts of vegetables, are nutritious, wholesome, and digestible, according to the nature and proportion of these principles contained in them.

The lightest kind of nourishment is afforded by the mucilage, jelly and acids of vegetables. The sugar and fixed oils are more nutritive; but not so digestible. The starch and gluten are the most nutritive; and together with mucilage, are, at the same time, the most abundant principles contained in those vegetables, from which man derives his sustenance. Of these, the gluten approaches nearest the nature of animal substances. Wheat, barley, oats, rye, rice, millet, and Indian corn, abound in farinaceous matter, a compound of the most nutritive alimentary principles of vegetables.

Wheat flour contains by much the largest quantity of gluten; the flour of other nutritive grains, but very little of it. It is this large proportion of gluten, which gives the superiority to wheat over all other grains. Starch and mucilage are the chief alimentary principles of other grains; and hence, the bread formed from them is inferior to that made of wheat.

Rice is the chief sustenance of some nations; and when boiled, affords an agreeable and nourishing food, of easy digestion, and not so apt to sour on the stomach as some other grains. Barley bread is viscid and not very digestible. Rye bread is acescent, and not so easily digested; but useful in costive habits, from its tendency to open the bowels. Oat bread is nutritive and wholesome, and easy to be digested. The flour of millet forms but indifferent bread, but excellent, wholesome and nourishing pottages and puddings. Indian corn is nutritive and laxative.

The seeds of leguminous plants, such as peas and beans, afford a great quantity of alimentary matter; though less than the grains we have noticed. The nutritious matter is a compound of starch and mucilage. Their flour is sometimes formed into bread; but it is coarse and

indifferent, and not easily digestible. These seeds are not more nutritive, but generally more palatable and wholesome when green, young, and tender, and simply boiled, than when fully ripened and baked. Yet, with some constitutions, they are apt to produce flatulency, and disorder of the stomach and bowels.

The potato, either boiled or roasted, as it is one of the most useful, is, perhaps, after the grains, one of the most wholesome, and most nutritive vegetables in common use. Its alimentary properties are great, as is proved by general experience, and especially by that of the Irish peasantry, a robust and hardy race, who derive their principal sustenance from this invaluable root. When mixed with wheat, it forms a wholesome and nutritive bread. The sweet, or Spanish potato, yam, and artichoke, come near to the potato in their nutritive properties; but do not equal it. The roots of parsnips, turnips, and carrots, contain a considerable quantity of mucilage, and a small portion of saccharine matter. When boiled, they are considerably nutritive; and by most stomachs easily digested.

The beet, both white and red, contains a large proportion of sugar. They are fine for cattle; but cannot be safely used in great quantities by man, as they are apt to induce flatulence and indigestion.

In some roots, as in the onion, leek and garlic, the nutritive principle is found combined with an *acrid* principle, which renders them less fit for the purposes of aliment. This principle, however, is lessened by boiling, and then they are lightly nutritive and mucilaginous. The radish, too, is an acrid root; and though much used, affords little nutriment, while it is apt to produce flatulence, and disorder of the stomach.

In some seeds, called kernels, as in the hardnut and filbert, walnut, almond, cocoa nut, cashew nut, chocolate nut, we find oil combined with their farina. This renders them nutritious; but, at the same time, indigestible. When freely used they are sure to produce flatulence, thirst, nausea, pain of the stomach, and headache, more especially if from age they have become rancid. Hence they should be used sparingly, at any time.

Chocolate, which is prepared from the chocolate nut, forms a well known, wholesome, nutritious aliment, employed, in many cases, as a restorative. Cocoa, which is prepared from the same nut, is however, less oily; and, on this account, decidedly preferable for weak stomachs to the chocolate.

Fixed oil is contained in many vegetables, and is sometimes obtained by expression, and is highly nutritive. Olive oil is much used in several parts of the world, particularly in Italy and the south of France. In these countries it is used in lieu of butter. In other countries it is used chiefly as a sauce, or condiment to sallads and fish. With many stomachs it disagrees, being too heavy and indigestible.

The leaves, stalks and flowers of vegetables, contain much less nutritious matter than the seeds and roots, already noticed. They are cooling and aperient, however, and sure to correct the stimulant, and binding effects of animal food. The vegetables to which these remarks apply, are cabbage, colewort, cauliflower, brocoli, sea-kale, endive, lettuce, purslane, spinage, and asparagus. Of these, there is none more

tender, or more wholesome than spinage. Of the varieties of cabbage, the brocoli and cauliflower are the most easily digested, and less flatulent. The asparagus is an excellent vegetable, agreeable and wholesome, tolerably nutritious, and besides, is diuretic. The endive and lettuce are chiefly used as sallads. Lettuce has, also, some degree of narcotic and soporific effect, a quality which depends on the bitter, milky juice contained in the leaf stalk. Parsley is slightly aromatic, little nutritive, and chiefly used to season broths, sallads, &c. Celery is highly relished by many people, as a sallad; but, raw, is not easily digested.

Of fruits, such as the peach, apricot, plum, cherry, date, fig, pear, apple, mulberry, orange, lemon, it may be observed, that they do not abound in nutritive qualities. Their nourishment depends upon the mucilage and sugar they contain. Together with these principles, and water, many of them, also, contain the different vegetable acids, the malic, citric, tartaric, &c.; and it is this combination which renders them so agreeable to the taste, and so generally relished by man.

From this combination of principles, too, may be estimated the advantages and disadvantages they possess as aliments. They are nourishing, in proportion to the mucilage, jelly and sugar, which they contain; cooling, and aperient, and antisceptic, in proportion as they are watery and acidulous. They are not of themselves capable of long supporting the strength, and renewing the waste of the system; but, conjoined with other more nutritious aliments, ripe fruits are, in their season, safe, useful, and often highly beneficial adjuvants to our diet. They obviate and correct the stimulant, and sceptic effect of animal food: open the body, and cool and refresh the system. Hence, they are found so eminently useful in febrile, inflammatory and scorbutic affections. Indeed, in the sea scurvy, a disease arising from the too exclusive use of a stimulating animal diet, the sub-acid fruits are sovereign remedies. By the same properties, however, they are hurtful, in cases of gravel, stone and diabetes. Intemperately eaten, fruits have in all constitutions, and particularly in the nervous, dyspeptic, and hysteric, produced great disorder of the stomach and bowels, colic, diarrhœa, and cholera. Upon the whole, as a *part of* our daily diet, fruits are safe, and useful; but, excepting under particular circumstances, they ought not to form the whole of any one meal, and should never be indulged in to satiety.

The pulpy fruits, such as the fig, and apple tribe, are more nutritive than the more watery, acidulous fruits, as the orange, grape and berry. The former, too, when conserved, boiled or baked, afford a light and wholesome nourishment. The sub-acid fruits, as gooseberries and currants, are advantageously made into tarts, jellies, &c. The nourishment derived from them is not great; but they are wholesome, antisceptic, and cooling.

We shall next speak of animal substances. The alimentary principles of which are *gelatin*, *albumen*, *fibrin*, and *oil* or *fat*.

*Gelatin*, or animal jelly, is a colorless, transparent, tremulous substance, found in calves' feet, in the skin, tendons, and bones of all animals. Glue and isinglass are specimens of dried gelatin. Animal jelly, when properly prepared, is very nutritious, and well adapted to persons in a convalescent state.

*Albumen* is distinguished from gelatin, by its coagulating on the application of heat. The white of an egg presents us with the best and most familiar example of the albumen. It exists in the serum of blood, and the curd of milk; and forms a principal part of the cartilages, membrane, hoofs, horns, feathers, quills, and hair of animals. As an aliment, it is highly nutritive; it is not used as a *separate* article of diet, except as it exists in the white of an egg.

*Fibrin* is the chief constituent of muscular flesh. It is a white, tough, elastic, fibrous substance, insoluble in water, and contains more nitrogen than any of the other principles. It is readily dissolved by the gastric fluid, and may be regarded as the strongest, and most stimulant of aliments.

*Animal oil* or *fat*, is a nutritious, component part of animal substances; but less easily digested than the other alimentary principles.

Animal aliment may be distinguished into *fluids* and *solids*. The only fluids, which can be regarded as alimentary, are the *blood* and *milk* of animals.

The blood is composed of the three alimentary principles, fibrin, albumen, and gelatin; it contains, besides, water, the red globules, and some saline matters. Blood is a heavy and indigestible aliment, in whatever way prepared.

Milk is the fluid secreted by the female of the mammalia class, for the nourishment of their young. It consists of oil, albuminous and saccharine matter, water, and some saline matters. Hence it will be seen, that, as it contains both animal and vegetable principles, it is a sort of mixed aliment. It is nutritious and wholesome; but not equally well digested by every stomach. It sometimes offends in two ways; first, coagulating very firmly in the stomach, it occasions sickness, and is afterwards rejected by vomiting; secondly, becoming acid, it gives rise to flatulence, heart burn, gripings and diarrhœa. Still, most people bear milk well, but when it sits too heavily on the stomach, it is advantageously diluted with water. Sometimes, again, it agrees better, after having been boiled, though it is then more apt to produce costiveness.

Butter, the oily part of milk, is nutritious; and when moderately used, is wholesome. Like the other animal oils, however, it is too heavy to be used by itself. Curd, separated from the whey, is an agreeable and nutritive aliment, differing, however, but little from uncoagulated milk. Cheese, which is a curd subjected to strong pressure, is highly nutritious; but, as an aliment, is difficult of digestion, especially when new. Buttermilk is moderately nutritious. It is, moreover, somewhat acid, and, thus affords a wholesome, cooling beverage, grateful and very useful in a heated, or feverish state of the body. Whey contains in solution, the saccharine and saline parts of the milk, with a small portion of the animal principles. Its nutritive powers are not great.

Eggs come next to be considered. Those of the common domestic fowl are the best. Though eggs of different fowls differ less in alimentary properties than might, at first, be expected. The chief difference consists in some variety of flavor. The white of an egg consists almost entirely of albumen. The yolk contains albuminous matter, oil,

gelatin and water. Thus the egg is formed of the most nutritive alimentary principles. It is a remark of Dr. Cullen, "that a smaller bulk of this, than of any other food, will satisfy and occupy the digestive powers of most men."

Of the solid parts of animals, almost all are alimentary; and according to the nature, proportion and state of combination, of the principles of which they are formed, they are more or less nourishing, and more or less easy of digestion.

The *white parts* comprehending the skin, cellular texture, the membranes, ligaments, cartilages and tendons, which consist almost entirely of gelatin, and condensed albumen, unless they have been much softened and dissolved into jelly, by long boiling, are more difficult of digestion, and afford, even then, a nutriment of a lighter and less stimulating nature, than that derived from other parts, containing a due admixture of the other alimentary principles.

Cow-heel, calf-head, sheep-head, and trotters, afford examples of this kind of aliment, which, unless extremely well boiled, is far from being easily digested.

The gelatin of bones is digestible, and alimentary, only after it has been extracted and dissolved in water.

Tripe, the stomach of ruminating quadrupeds, is nearly allied to the white membranous parts, in composition and alimentary properties. The stomach, however, circulates more red blood, contains besides, a certain portion of muscular fibre, is more animalized, and furnishes accordingly a more savory aliment, perhaps a more nourishing one, than those parts entirely formed of gelatin.

We find it more difficult to estimate the alimentary qualities of the glandular parts of animals. The spleen and kidneys are enumerated by Celsus, with those aliments which afford a bad, and the liver with those which yield a good juice. All that we can venture to say on this subject is, that the glandular parts of young animals, if freed from the odor of their peculiar secretions, are agreeable, and sufficiently nutritive aliments. The pancreas, or sweet-bread, is the most delicate, the least stimulating, and perhaps the most digestible. The spleen is a coarse, and not very digestible aliment. The brain, too, is heavy, and apt to disagree with some stomachs. The liver, especially that of young animals, and of some birds, is by many esteemed a great delicacy, and appears to be very wholesome. The liver of many fishes abounds in oil.

The muscular flesh, which constitutes, indeed, the chief part of our food, derived from the animal kingdom, appears to be, upon the whole, the most nourishing, the most wholesome, and the most easily digested of any.

Its advantages in these respects, may well be attributed to its peculiar composition—a just assemblage of all the alimentary principles. For the flesh, besides containing the largest quantity of fibrin, has, also, a due proportion of gelatin, albumen and fat. And, indeed, the alimentary properties of different kinds of flesh, appear to depend in a great measure, on the proportions and aggregation of these principles. Thus the flesh of young animals contains more gelatin, and less fibrin, than that

of the full grown and older: and yields, at the same time, a lighter nutriment and of less easy digestion. Very old, hard, tough flesh, contains, again, too little gelatin and fat; the fibrin has become firmer and less soluble; and therefore, such meat is less succulent, less digestible, and less nutritive than the same kind of flesh, in its prime. By boiling, the gelatin, and a portion of albumen are extracted; and hence, perhaps it is, that boiled meat is less nourishing and digestible than roasted flesh, which retains all its principles.

Muscular flesh contains a larger quantity of red blood, from which, indeed, it derives its color, than any of the other parts of animals, commonly employed as aliment. Whether or not, any of its alimentary qualities may depend on this circumstance, we cannot confidently say. But red-colored flesh is certainly a stronger, and more nourishing food than the white-colored muscle—the flesh of the ox, for example, than that of the rabbit.

Chemists have detected another principle in muscular flesh, to which they have given the name of extractive. This principle is soluble in alcohol, of a brownish red color, an aromatic odor, and strong acrid taste.

The particular flavors of flesh have been attributed to this principle, which may probably add, also, to its stimulant properties, if not to its nutritive.

The flesh of quadrupeds is more largely consumed than that of any other class of animals. But, as might be supposed, they differ considerably in their alimentary properties.

Bull beef is tough, dry, of a disagreeable flavor; and is therefore, seldom eaten. This affords us one example of the great amelioration of the alimentary qualities of the flesh of animals by castration; for ox beef is at once agreeable, nourishing, wholesome, and tenderer, even than the flesh of the cow. Veal, the flesh of the young animal, is more delicate, and more gelatinous than beef; but at the same time, less nourishing, less stimulant, and, in general, not so easily digested. It is less animalized, and therefore, less putrescent, than almost any other flesh. Indeed, the jelly and broth of very young veal is disposed to become even acescent.

Mutton is esteemed one of the best aliments; it is also one of the most common. The flesh of the uncastrated animal is hardly eatable. Wether mutton, not under two years old, is agreeable, tender, and succulent; at five years old, it has probably attained its highest perfection. Ewe mutton is much inferior to it. Lamb bears the same relation, in its alimentary properties, to mutton, that veal does to beef. It is less stimulant, and less nutritive than mutton. But if the lamb have been properly nursed for six months, or a little more, and not weaned, as is too often done at two months old, it affords a most agreeable, sufficiently nourishing, and digestible aliment.

Goat's flesh is coarser, and in every respect inferior to that of the sheep. The flesh of the kid is sufficiently tender and delicate.

Venison is an aliment in great estimation. It is very nutritive, and easily digested. The flesh of the young fawn is tender, succulent, and gelatinous; but the most nutritive and best flavored is that of the full grown animal, of four years old, or more. The best season for killing

it, is in the month of August; for in the rutting season, September and October, the animal becomes lean, and its flesh rank, tough, and ill flavored. The flesh of the female is at all times inferior to that of the male. The fallow deer is commonly better fattened than the stag, and its flesh, upon the whole, is tenderer. That of the roe-buck is also very tender; but it is inferior in flavor and other qualities, to the fallow deer.

Pork is an aliment, without doubt, highly nutritious; but on account of the fat with which it abounds, not so digestible. It is stimulant, and savory, though its particular flavor is not agreeable to every one. It yields, however to those with whom it agrees, much nourishment. By the ancients, it was regarded as the strongest of all aliments; and was, therefore, much employed in the diet of the athletæ, or persons who engaged in the public games. The flesh of the boar is strong, coarse, and ill-flavored; that of the sow, which has farrowed, is also disagreeable. The flesh of the castrated animal is freed from this ill-flavor; it is also fatter, tenderer, and more digestible. The flesh of the sucking pig, like that of other young animals, abounds in gelatin, and affords a more delicate, lighter and less stimulant aliment, than that of the full grown animal.

The hare and rabbit afford agreeable and wholesome food. The former is more dense, higher flavored, and more stimulant than the latter; the flesh of which is white and delicate, and, of the young rabbit, very tender and easily digestible.

The aliment obtained from birds is, in general, less nourishing than that derived from the mammiferous quadrupeds. The flesh of those birds which feed on grain and fruits, is the most delicate, and most easily digested.

The flesh of water-fowl, and such as devour fish, insects, and the like, is commonly very alkalescent, oily, strong flavored, highly nourishing, but heavy, and of more difficult digestion.

The birds in most common use, and yielding at the same time, the best aliment, belong to the gallinaceous family. Their flesh is white, of the most agreeable and delicate flavor, little heating; and when not too old, succulent, nutritive, and easily digested. To this order belong the dunghill fowl, Pheasant, Turkey, Peacock, Guinea hen, Partridge, and Quail. The flesh of the Goose, domestic and wild, of the Duck, Widgeon, and Teal, is very nourishing; but considerably heating, and strong flavored. They are not, therefore, so well suited to the weak and delicate as the fowls above named; nor are they in general, so easily digested. The woodcock, snipe, plover, and some other of this family, (Grallœ,) are savory and well flavored aliments, moderately stimulant, wholesome, and sufficiently digestible. Pigeons afford a very rich and stimulant food. The different species of the lark, furnish a delicate and lighter aliment.

Of amphibious animals, the sea-turtle, land-turtle, frog and viper only, are used as aliment. The flesh of the turtle is white, tender and nourishing. The rich fat, with which it abounds, is not so easily digested. But if plainly dressed, the turtle, upon the whole, affords a wholesome and nutritious aliment, not very different from the flesh of young quadrupeds. The frog is not known, it is believed, as an aliment in the

United States. The hinder legs alone, are served up in France, and some other countries; but, though the flesh has a white and delicate appearance, it is insipid and not very nourishing. In Italy, the viper broth is still used. But there is no good reason to suppose that it possesses any peculiar properties as a restorative.

We shall next speak of fish. Fishes circulate but little red blood; and their temperature hardly exceeds that of the element in which they live. The muscular parts have little color, and their texture is soft. These abound most in a watery, gelatinous, and albuminous matter, and their fibrin possesses less elasticity and cohesion, than that of the flesh of terrestrial animals. Their oil, too, is thinner, and not concresible, like that of quadrupeds and birds. They afford a less nourishing aliment than flesh weight for weight; and are of more difficult digestion and assimilation. In some particular constitutions, fish not only disagrees with the stomach, producing flatulence, sickness and vomiting, but occasions more general and lasting disorder, if continued. Yet many fish afford an aliment, abundantly wholesome to most people. And from being less stimulant, they are, in some cases, better adapted to the sick and convalescent than the richer aliment of flesh.

The red blooded fish, and those which abound with oil, are more stimulant and more nutritive, than the white blooded. But they are also heavier, and more apt to disagree with the stomach, especially of the delicate and dyspeptic. The cod and whiting, for example, afford a much lighter aliment than the salmon, the eel, the mackerel, and the herring. Sea fish are, also, upon the whole, more nourishing and more palatable, than those which inhabit the rivers and fresh water.

A very great variety of fish is, in different parts of the world, used as aliment. But it is enough to have marked the general qualities of this kind of food. And, indeed, there seems so little real difference in the alimentary properties of those genera and species, commonly employed, that to be more particular than we have been, would be a useless and unprofitable labor, even could we do this with any tolerable degree of certainty.

The flesh of the Crab, Lobster, Craw-fish, Prawn, Shrimp, White Shrimp, bear a close resemblance in flavor, color, and texture, to fish; from which, indeed, they do not greatly differ in alimentary properties. There is little or no oil in their composition; and they are said to yield less ammonia during their decomposition, than flesh or fish do. They are in general of more difficult digestion, and are allowed to afford less nourishment. The meat contained in the body of the crab is rich, high flavored, more stimulant, and probably more nutritive; but extremely heavy, and apt to disagree with the stomach and bowels. The flesh within the claws is lighter and more wholesome. The lobster is esteemed more delicate and palatable than the crab. It is also moderately nourishing, but not very digestible. Both, indeed, are apt in some constitutions to occasion great disorder, colic, fever, itching and efflorescence of the skin. The craw fish is, in alimentary properties, similar to the lobster. The prawn and shrimp are delicate, and well flavored foods of the same kind. The decoction or broth of the three last, is much used on the continent, and much extolled, though without any sufficient reason, as purifying and restorative.

Of shell fish, not many are used as articles of diet. Those which are esteemed the best, are the cockle, oyster, muscle, and snail. All these abound in soft mucous and albuminous matter, coagulable by heat, on which their alimentary powers would seem to depend. They furnish us with almost the only example of any animal food that is ever eaten in the raw, and even living state. Of these, the best is unquestionably the oyster, which is highly esteemed in the raw and live state, and with the healthy and robust stomach, it commonly agrees well.

But with the weak and dyspeptic, it often occasions considerable disorder, and does not appear to be easily digested. Indeed, there are many, whose stomachs do not appear faulty in other respects, who cannot digest raw oysters; and yet bear them well enough when roasted, stewed or boiled. They appear, therefore to be, on the whole, more generally wholesome, and digestible in the last state, than raw. A few raw oysters, eaten before dinner, appear sometimes to increase the appetite, an effect which is to be attributed rather to the salt than to the oyster itself. The nourishment afforded by this kind of food does not appear to be very great. Where they do not disagree with the stomach, oysters are, therefore, sometimes usefully taken as a light restorative aliment, by the feeble and consumptive, when more stimulant and nourishing food would be improper. The other shell fish are similar in alimentary properties to the oyster, though greatly inferior in delicacy and flavor, and much less fitted to be eaten raw. The muscle, in particular constitutions, has occasioned distressing, and even dangerous symptoms; sickness and pain of the stomach, violent retching, fever, heat, pain, swelling of the eyes, face, mouth, and throat, and erysipelatous inflammation of the skin, especially if eaten in the months of July and August.

Scarcely any of the various elementary substances employed by man are used in the raw and crude state, in which they are presented to him by nature. Almost all of them are previously subjected to some kind of preparation or change.

The preparatory changes to which our food is usually subjected, are produced by the application of heat, and by the admixture of water, and of condiments or seasonings.

By the application of heat to vegetables, the more volatile and watery parts are, in some cases, dissipated. The different principles, according to their peculiar properties, are extracted, softened, dissolved, or coagulated; but most commonly they are forced into new combinations, so as to be no longer distinguishable, by the forms and properties which they formerly possessed.

When in the preparation of bread, a baking heat is applied to the paste formed of flour and water, a complete change is effected in the constituent principles of this mixture, so that in making the analysis of bread, the proximate ingredients of flour are not to be found in it. A new substance, bread, has been produced, which is more digestible in the human stomach, more wholesome, and more nutritive, than the materials from which it is formed.

In like manner, the leguminous seeds and farinaceous roots, are greatly altered by the application of heat. The raw potato, for example, is watery, ill flavored, extremely indigestible, and even unwholesome. By

roasting, or boiling, it becomes dry, friable, farinaceous, sweet, and agreeable to the taste, wholesome, digestible, and highly nutritive. Little is lost, and nothing is added to the potato by this preparation; yet its properties are greatly changed: its principles, in short, have suffered a derangement and new collocation.

Other examples of such changes are presented to us in the boiling, roasting, and baking of many fruits; in which processes, we sometimes find acid destroyed, saccharine matter formed, mucilage and jelly extracted, and combined anew, so that the product shall be more palatable, wholesome, and nourishing, than the raw material.

Even in the simple boiling of the various pot-herbs, and esculent roots, the effect does not seem confined to the mere softening of the fibres, the solution of some, and coagulation of others of their juices and principles; not their texture only, but their flavor, and other sensible qualities, have undergone a change, by which their alimentary properties have been improved.

In general, vegetable substances, after having been thus prepared, are more wholesome, less flatulent, and more digestible, than in their crude state.

The changes produced in animal substances, prepared for our tables, by heat, are different according to the manner in which it is applied, in the various processes of roasting, baking, frying, broiling, stewing and boiling.

In the usual way of roasting meat, there is little loss of the succulent or nutritive principles of the flesh; they are not even greatly changed, for if the meat have not been overdone, they may still be obtained from it, by the usual modes of analysis. Some changes, however, both of texture and composition, it has certainly suffered. It is more tender than before, and much higher flavored. Roasting seems, therefore, the simplest, and, upon the whole, the best mode of preparing the flesh of animals. It is wholesome, and highly nourishing; and, in general, more easily digested, than when prepared in any other way. It is often found to sit more easily on the stomach, and to be sooner digested by the dyspeptic and feeble, than boiled meat, or broth.

By the methods of baking and stewing, the whole of the alimentary principles are also preserved, but not unchanged; for in these processes, by the longer continuance of heat and moisture, the meat is more disorganized, the jelly, oil, and albumen, are separated, dissolved, mixed, or combined anew. These preparations are accordingly savory, rich, and glutinous, very nourishing, without doubt; but not near so easily digested, as meat simply roasted or boiled. Above all, the whole variety of stews, meat pies, and the like, are extremely apt to disagree with and disorder the stomachs of the gouty and dyspeptic.

In boiling, part of the soluble principles is always extracted by the water; but if the process have not been carried too far, the flesh is still sufficiently succulent and juicy; and, at the same time, very tender, abundantly nourishing, and by most people, easily enough digested. Boiled meat has less flavor than roasted, and appears to be somewhat less stimulant. Over boiled meat, from which the greater part of the soluble principles has been extracted, is dry, and insipid, less soluble in the stomach, and much less nutritious.

Boiling is, also, employed with the more immediate intention of extracting and dissolving the more soluble parts of animal matters, as in the preparation of soups, broths, and jellies. These are necessarily lighter, or more nourishing, according to the quality and parts of the meat used in their preparation.

The lighter and less costly broths afford an aliment abundantly wholesome. The richer soups are heavy, and liable to all the inconveniences of stewed meats. Though soups are less nourishing than the solid meat, from which they are extracted, they do not appear to be always so easily digested; and, indeed, those who are liable to stomach complaints, generally find that plain roasted and boiled meat sits easier with them than any kind of soup or broth.

Under the head of aliment, it is usual to include condiments and drinks. Of these we shall treat, sufficient for our purpose, in the subsequent pages of our work. We shall, therefore, next proceed to some additional observations upon various aliments of a more detailed and miscellaneous character.

## SECTION I.

### ARTIFICIAL ALIMENTS.

BREAD. At the head of the vegetable class stands bread; that article, which, from general use, has received the name of "the staff of life." Of the manner of making it, it is unnecessary to speak.

It is made, as is well known, from different species of grain; *wheat*, *barley*, *rye*, *oats*, *&c.*; but of all the articles of which bread is made, none is so nutritious as that which is obtained from wheat. This arises from the fact, that wheat contains not only more nutritive matter as a whole, but it also contains considerable more *gluten* than any other grain, with which we are at present acquainted. Of 1000 parts of *Middlesex wheat*, according to Sir Humphrey Davy, the whole quantity of nutritive matter is 955 parts; of these, *mucilage*, or *starch*, forms 765, and *gluten* 190. An analysis of some *Sicilian wheat* produced 961 parts of nutritive matter, of which 722 parts were *mucilage*, or *starch*, and 239 *gluten*. In short, it appears from numerous experiments, that wheat generally contains at least *double* the quantity of gluten found in most other grain, as well as considerably more starch than either *oats*, *beans*, or *peas*. Norfolk *barley*, however, contains more starch than wheat; but as its proportion of *gluten* is much less than in that grain, it is neither so nutritious, nor will it make such good bread as wheat. It appears, too, that no grain which does not contain a considerable quantity of gluten, will make good bread; the gluten being essential to the raised or porous appearance of it. *Gluten* is, besides, a peculiar substance, which approaches much nearer to the nature of animal matter than any other vegetable production, and hence we may learn why it is more likely to assimilate with, and nourish the animal body. Gluten yields, by destructive distillation, ammonia, and appears to be, in other respects, similar to the substance found in animals, called albumen.

We may just add, that wheat contains, besides the ingredients above mentioned, a portion of sugar; and, as unfermented flour, when taken into the stomach, almost immediately enters into active fermentation, producing flatulence, and other unpleasant consequences, the necessity for its being first fermented, and afterwards baked, to complete the process, so as to render the bread suitable for the stomach, is apparent.

STARCH, as we have seen in the preceding article, forms a large portion of the composition of wheat, as well as innumerable other vegetable substances. It is well known as a white powdery substance, insoluble in cold, but readily soluble in hot water, when at a temperature between 160° and 180°. Its solution is gelatinous, and, by careful evaporation, it yields a substance resembling gum in appearance. It appears that in their ultimate elements, *starch* and sugar differ little in composition, and hence it often happens that the former is converted into the latter. Starch is nevertheless much better calculated for human food than sugar, as it does not appear to undergo in the stomach that peculiar change which saccharine matter frequently does, producing flatulence and other unpleasant symptoms. Besides the use of starch as food, in various vegetables, it is used for many purposes in the arts and manufactures; and also occasionally as a medicine.

SUGAR, or *Saccharum*, is the general basis of sweetness in all vegetable substances. It is found also in milk, and a few other animal secretions. It is obtained from various vegetables in considerable quantity, but more commonly from *beet root*, and from the juice of the *sugar maple*, a tree growing plentifully in the back settlements of North-America. But most of the sugar used is obtained from a reed or cane, growing in the East and West Indies, and southern part of the United States.

The *common sugar cane*, *saccharum officinarum*, has flat leaves and panicled flowers; it has a jointed reed-root, from which ascend four or more shoots (proportionable to the age and strength of the root,) eight or ten feet high, according to the goodness of the ground; in some moist soils, the cane has measured twenty feet, but such are seldom so productive. This species of sugar cane has three varieties, the *white*, the *red*, and the *elephantine sugar cane*. It is a native of both the Indies, and also of the islands of the South Sea. It may be increased by slips or suckers from the root, or by cuttings. In its natural climate, it is planted by cuttings in parallel furrows, where it comes to perfection in about fourteen months; when ripe, the reeds are cut off at a joint near the root, cleared of the leaves, tied up in bundles, and sent to the mills, where, being cut in short pieces, they are squeezed till all the juice is obtained from them. It is then evaporated, with the addition of a small quantity of lime, until it becomes thick, when it is transferred into wooden coolers, where a portion concretes into a crystallized mass, which is drained and exported to this country, under the name of *muscovado* or *raw sugar*. The remaining liquid portion is called *molasses*, or *treacle*, which, in the West Indies, with other refuse saccharine matter, is commonly converted into *rum*.

Sugar is *refined* by boiling it in pans with lime water, mixed with a certain portion of bullock's blood. The albumen of the blood mixes with the impurities of the sugar, which, rising to the surface, are skimmed off. Occasionally, we believe, the whites of eggs and butter are

also used. When the sugar is sufficiently purified, it is placed in coolers, where it is violently agitated, till it becomes thick and granulated, it is then poured into conical earthen moulds, previously soaked in water, and again agitated. When sufficiently cold, the moulds with the sugar in them, are set with their broad ends upwards, in earthen pots, when the first portion of liquid molasses runs down; pipe clay, mixed with water, to the consistence of thick cream, is now laid upon the sugar, about an inch thick; the water leaving the pipe clay, descends through the sugar, washing out the molasses and other coloring matter. The process of claying is often repeated. The loaves are afterwards dried in a stove.

TEA. *Thea*, or, as the Japanese call it, *Teah*, is the leaf of a tree or shrub growing in several provinces of China, Japan, and Siam; an infusion of which is in general use as drink, and is called also *tea*. The tea-plant likes valleys, the feet of mountains, and a stoney soil; it is likewise found in mountains and rocky districts. Its seed is usually sown in places exposed to the south; and bears three years after sown. The root resembles that of the peach tree; the leaves are green, sharpish at the point, and pretty narrow, an inch and a half long, and jagged all around. The flower is much like that of the wild rose. The fruit is of different forms, round, long, or triangular, the ordinary size of a bean, containing two or three peas, including each a kernel. These peas are the seeds by which the plant is propagated. Botanists have in fact distinguished two tea shrubs; one they call *Thea bohea*, or the Bohea tea plant; the other *Thea viridis* or *Green tea* plant; but it is probable that more species, or at least more varieties exist than two, as the numerous kinds and qualities of teas would seem to indicate.

The tree is a branchy, evergreen shrub, growing to the height of four or five feet, although some have asserted that it reaches thirty. The best time to gather the leaves of tea, is while they are yet small, young and juicy; when gathered, they are passed over the vapor of boiling water, to moisten them; they are then laid on porcelain plates, which are heated; and by thus drying the leaves, they curl up in the manner they are brought to us. It is very rare to find tea perfectly pure; the Chinese always mixing other herbs with it to increase the quantity, though among them it is sold at a price moderate enough; from three-pence to nine-pence per pound. The seasons for collecting the leaves, are April, June, and September.

Much has been said and written about the properties of tea. The reason why the gout and stone are unknown in China, is ascribed to the use of this plant; which is further said to cure indigestion, dispel wind, &c. From analytical experiments on tea, made some time since, at the Royal Institution, no deleterious properties were detected in either *green* or *black* tea; nor has there been in green tea discovered the least particle of copper. The injurious effects of tea, if indeed any be produced by it, may be attributed, we presume, to the *hot* water, rather than to the tea.

COFFEE is a seed or berry, brought originally from Arabia Felix, used for making a drink of the same nature. By coffee we usually mean the drink itself prepared from those berries. Its origin is not well known; some ascribe it to the prior of the monastery, who, being informed by a goatherd, that his cattle, sometimes browsing on this tree

would wake and caper all night, became desirous of proving its virtue; accordingly he first tried it on his monks, to prevent their sleeping at matins. Others refer the invention of coffee to the Persians, from whom it was learned in the fifteenth century, by a mufti of Aden, a city near the mouth of the Red Sea; and who, having tried its virtues himself, and found that it dissipated the fumes which oppress the head, inspired joy, opened the bowels, and prevented sleep without his being incommoded by it, recommended it first to his dervises, with whom he used to spend the night in prayer. Their example brought coffee into fashion at Aden; there the professors of the law for study, artisans to work, travellers to walk in the night, in short, almost every person drank coffee. Thence it passed to Mecca, and from Arabia Felix to Cairo, and from Egypt to Syria and Constantinople. Thevenot, the traveller, was the first who brought it into France; and a Greek servant called Pasqua, brought it into England in 1652, and setting up the profession of coffee man, first introduced the drink among us; though some say Dr. Harvey had used it before.

CHOCOLATE, a kind of cake, or confection, prepared from certain drugs; the basis or principle whereof is the *cacao* nut, or chocolate nut, a nut about the size of an almond, of which from thirty to a hundred are contained in a pod, shaped like a cucumber, and very different from the cocoa nut, with which it is apt to be confounded, from the similarity of pronunciation. The drink prepared from the cake is also called chocolate, and is usually drank warm, being esteemed not only an excellent nourishing food, but also a good medicine; or at least a diet for keeping up the warmth of the stomach, and assisting digestion. The Spainards were the first who brought chocolate into use in Europe.

The thin shell of the cacao nut, ground like coffee, and boiled in water, yields a beverage resembling chocolate, but less rich, and is used as an economical and wholesome breakfast, by the name of *cacao:* and for delicate stomachs is much better adapted than the oleous compound.

RICE, *oryza*, a grain or seed. It is frequent in Greece, Italy, Spain, the East and West Indies, and America. The grains of rice which grow in clusters, are severally inclosed in yellow rough cases. Rice grows in marshy places. A weak spirit, termed *arrack*, is drawn from rice. Rice is less nutritious than wheat, and forms a very useful light food for patients under the influence of medicine. The best rice comes from Carolina; an inferior sort from the East Indies. The mountain rice, the *paddy* of the Hindoos, grows in mountains and other dry soils of India.

It is said that America is indebted for this grain to a small bag of it, which was formerly given as a present from a Mr. Dubois, treasurer of the East India Company, to a Carolina merchant.

A wet and morassy soil and hot climate appear, in general, necessary to the cultivation of rice. The parts of the farms or plantations, in which it is grown, are usually so situated as to admit of being flooded; and, in many places, reservoirs of water are formed for this purpose. These reservoirs have sluices, by which the rice fields may be inundated at pleasure. In reaping the crop, the laborers generally work knee deep in water and mud; and as the rice is cut, the sheaves are put on drays, which follow the reapers, and are thus carried out to be spread on the dry

ground. The rice thus produced has the name of *marsh rice*, and is that which is chiefly exported to Europe.

The YAM is a root, the produce of a creeping plant whose stalks proceed to a considerable distance, putting out roots from the joints, by which it becomes soon multiplied. The roots consist of blue or brown round or oblong tubers, each tuber weighing two or three, or sometimes twenty pounds. They vary greatly, however, in size, shape and color. The inside of the yam is white, and in mealiness resembles the potato. When dressed, they are somewhat like that root; they are considered nutritive, and easy of digestion; they are the common food of the slaves in the West Indies; and if kept from moisture, may be preserved for many years. They are ground into flour, and made into bread and puddings. The plant is propagated by cuttings, precisely the same as we propagate potatos, namely, by cutting the root in pieces, preserving an eye in each piece.

The PLANTAIN or BANANA, (though they are thought by some to be distinct species,) are generally spoken of together, as having more points of resemblance than of dissimilarity. They grow in the same regions, and are applied to the same use.

The *plantain* is of considerable size; it rises with a herbaceous stalk, about five or six inches in diameter at the surface of the ground, but tapering upwards to the height of fifteen or twenty feet. The leaves are in a cluster at the top; they are very large, being about six feet long and two feet broad; the middle rib is strong, but the rest of the leaf is tender and apt to be torn by the wind. The leaves grow with great rapidity, after the stalk has attained its proper height. The spike of flowers rises from the centre of the leaves to the height of about four feet. At first, the flowers are enclosed in a sheath, but as they come to maturity, that drops off. The fruit is about an inch in diameter, eight or nine inches long, and bent a little on one side. As it ripens, it turns yellow; and when ripe, it is filled with a pulp of a luscious sweet taste.

The *Banana* is a shorter and rounder fruit than the plantain: the stem is also different,—that of the plantain being wholly green, while the banana is spotted with purple. The banana is not so luscious as the plantain, but is more agreeable.

The banana is found in equinoctial Asia and America, in the tropical parts of Africa, and of the islands of the Atlantic and Pacific oceans,

wherever the mean heat of the year exceeds 75° of Fahrenheit. The banana is one of the most important and interesting objects for the cultivation of man.

The banana is not known in an uncultivated state. The plant is propagated by suckers. It is ten or eleven months after the sucker has been planted before the fruit is ready to gather. The stalk is then cut, from which sprouts put forth, which bear fruit again in three months. They are exceedingly productive. A spot of a little more than a thousand square feet will contain from thirty to forty banana plants. A cluster of bananas produced on a single plant, often contains from one hundred and sixty, to one hundred and eighty pounds. But reckoning the weight of a cluster only at forty pounds, such a plantation would produce more than four thousand pounds of nutritive substance. M. Humboldt calculates that as 33 pounds of wheat, and 99 pounds of potato require the same space as that in which four thousand pounds of bananas are grown, the produce of bananas is consequently to that of wheat as 133 : 1, and to that of potatos as 44 : 1.

The ripe fruit of the banana is preserved like the fig, by being dried in the sun. This dried banana is an agreeable and healthy aliment. Meal is extracted from the fruit, by cutting it into slices, drying it in the sun, and then pounding it.

BREAD-FRUIT TREE, a tree growing at Otaheite and other South Sea Islands; it was brought to the notice of Europeans, by Captain Cook. It has the height and proportion of a middle sized oak; the leaves are often a foot and a half long, oblòng shaped, and in color, consistence and sinuosity, resembling those of the fig-tree, and exuding a milky juice on fracture. The fruit is about the size and shape of a new born child's head, covered with a reticulate skin, and containing a core in its centre. The eatable part lies between the skin and the core, is as white as snow, and of the consistence of new bread. It is prepared for food in various ways. It affords much nourishment, and therefore is esteemed very proper for laboring people. Attempts have been lately made to naturalize this tree in the West Indies; it can only, it is said, be propagated by suckers or layers.

CHEESE, BUTTER. See article Agriculture—Management of the Dairy.

HONEY. See Bees.

## SECTION II.

### FRUITS.

ORANGES make a considerable article of merchandize. Those called China oranges were first brought into Europe from China by the Portuguese; and it is said that the very tree whence all the European orange trees of this sort were produced, is still preserved at Lisbon. The China orange is not so hardy as the Seville, and rarely produces good fruit in England; nor are the leaves of the tree near so large or beautiful,

as those of the Seville orange. There is a great variety of sweet oranges, both in the East and West Indies, some of which are much more esteemed than those now in Europe: but as they are much tenderer, they will not thrive in that country with the common culture. There are several varieties of the orange tree, but they may all be referred to the sweet, or China orange, and the bitter, or Seville orange, the juice of which, is sour. Those most esteemed, and that are made presents of as rarities in the Indies, are no larger than a billiard-ball. The juice is cooling and antiscorbutic.

The *seeds* of oranges ought never to be swallowed; a case of a young lady in England has recently occurred, in which her death was in all likelihood caused by several orange seeds lodging for a long time in the intestines.

The CITRON is the produce of a tree much resembling the lemon tree. A citron has the same qualities as the lemon, but it is larger, higher colored, and has a brisker smell. It is an agreeable fruit, and serves, like that, to cool and quench the thirst. Genoa is the great European nursery for this sort of fruit. The Florentine citron, Miller says, is in such great esteem, that the single fruits are sold at Florence for two shillings each, and are sent as presents to the courts of princes. This kind is not to be had in perfection in any other part of Italy, except the plain between Pisa and Leghorn, and if transplanted to other parts it loses much of its excellence. From citrons are produced essences, oils, confections, waters, &c.

The LEMON is a variety of the citron tree. There are several subvarieties of this tree, some of which are sour, and others, again, sweet. The lemon grows naturally in that part of India which is situated beyond the Ganges; but its transmigration to Europe belongs to the invasion of the West, by those mighty caliphs, who from the heart of Southern Asia, extended their conquests to the foot of the Pyrenees, leaving every where, traces of their power and of their knowledge. The lemon, thus transported by the Arabs into every part of their vast empire, where it would grow, was found by the crusaders in Syria and Palestine, towards the end of the twelfth century. By them it was introduced into Sicily and Italy; though it is probable that at the same period, it was already multiplied in Africa and Spain.

Lemon-juice is one of the most cooling and antiseptic vegetable productions: it improves the taste, and corrects the putrid tendency of animal food in the summer. Hence, lemonade affords a grateful and cooling beverage for febrile patients; but it should be used moderately, for all acids have a tendency to produce stone, gravel, and gout, when too freely taken.

*Essence of lemon* is obtained from the exterior rind of the fruit, either by compression or distillation; it is often an impure essential oil, as found in the shops.

The OLIVE, is an evergreen tree common to the woods of the south of France, Spain, and Italy. It rarely exceeds twenty feet in height; it has lanceolate, grey, ferruginous leaves, downy or silvery underneath; the flowers are small and white; the fruit is a drupe of an oblong form, about an inch and a half or two inches long, and black when ripe. Of the olive, there are several varieties. Abroad, it is propagated by shoots,

which are grafted to produce good sorts. In England, it is propagated by layers. The most valuable part of this tree, is the fruit; from which, when ripe, is obtained the *olive oil*, so well and universally known as food and as a medicine. Olives are bought in this country, pickled, as a condiment; but they are neither good, nor wholesome food.

The growth of olives, and the manufacture of the oil, furnishes a considerable employment to many of the inhabitants of France and Italy. The importation of olive oil into Great Britain, amounted, in 1827, to about four thousand five hundred tons, paying a duty of eight guineas per ton.

The ALMOND is a fruit enclosed in a thick stone, and under a thin skin. The tree that produces the almond is pretty tall, and resembles a peach tree. It is frequent in Germany, France, Spain and the neighboring countries, and also in Barbary. The flowers of this tree are ranged in the rose manner; the pistil becomes a fleshy fruit, containing a seed which is the almond, and which drops out when the fruit is arrived at maturity. There are two kinds, sweet and bitter; and it has been said that the same tree, by a difference in culture, has yielded both. In flavor, bitter almonds resemble water distilled from laurel leaves, and contain Prussic acid, which, in a pure state, is extremely poisonous. Sweet almonds are of a soft grateful taste; and are reputed cooling, healing, and nutritive. The *oil* of almonds is a safe emollient in pains arising from the stone or gravel; in coughs and hoarseness; and for costiveness and gripes in children. The quantity of almonds imported annually into Great Britain, is estimated at 450 tons, on which a duty is paid of £18,000.

TAMARINDS are brought from the East and West Indies. Some call them Indian dates, others Indian acacia. The tree which yields this fruit, is called, by the Indians, tamarinds, and by the Portuguese, tamarindos. It is not unlike our ash; its leaves resemble those of female fern; its flowers are joined eight or ten together, like those of the orange tree. Its fruit is a pod, from two to five inches or more in length, covered at first with a green rind, which afterwards becomes brown, and contains a blackish acid pulp, among which are found seeds resembling lupines. Tamarinds must be chosen large, the pods unbroken, and of a brisk taste. Those put up in *small* casks and preserved in sugar, not syrup, are the best. They are laxative, cooling, and good to quench thirst. These trees grow to a great magnitude in their native countries; but in Europe, they are preserved as curiosities by those who are lovers of rare plants.

PRUNES are plums dried and baked in an oven, or in the sun. The prunes chiefly used among us, are black, and are chiefly imported, we believe, from France. Great quantities are used by the English and Dutch. Prunes are slightly laxative. The *prunello brignole*, or *French plum*, is less dried than the common prunes, and much more grateful to the taste.

The CACAO *nut*, mentioned under chocolate, is the seed or fruit of the chocolate tree, which grows in several parts of the West Indies. It resembles our cherry tree; but is so very delicate, and the soil it grows

in so hot, that to guard it from the sun, it is always planted in the shade of another tree, called mother of cacao. Within the pod of the fruit is formed a tissue of white fibres; in the middle of these fibres are contained ten, twelve, or even forty grains of seeds, of a violet color, and as dry as acorns. Each grain, which is covered with a little rind, separates into five or six unequal pieces, in the middle whereof is a kernel, having a tender bud, very difficult to preserve. Of this seed, with the addition of other ingredients, chocolate is made. Some Spaniards have made five thousand pounds per annum from a single garden of cacaos. In several parts of America, the cacao grains are used by the Indians as money; twelve or fourteen are esteemed equivalent to a Spanish real, or five pence three farthings sterling.

The COCOA nut is the fruit of a tree of the family of palms. It is of a large size, being sometimes near a foot in length. Like a walnut, it has a soft external husk, from the fibres of which cordage may be made. This husk, in its early state, is edible and agreeably acid. The hard shell is sometimes mounted with silver, for drinking cups or sugar basins. Within the shell, is a large white kernel, pleasant to the taste, inclosing a very grateful fluid, called milk of cocoa. An oil like that of almonds may be obtained from the kernel.

The POMEGRANATE is a fruit in the form of an apple or quince, full of seeds or kernels, inclosed within a redish pulp, sometimes sweet, sometimes acid. It is so called, either from the abundance of its grains or kernels, *pomum granatum*, a kernelled apple, or from the country where it was anciently produced, viz. Grenada. The pomegranate is, however, a native of the south of Europe, and grows to the general height of an apple tree; the branches are a little prickly; the leaves resemble those of the green myrtle; the fruit, which is composed of red angular grains, is enclosed in little distinct cells, the whole of which are enveloped by a thick and highly astringent outer rind. Pomegranates are by some esteemed. Of the kernels are made syrups and preserves; the *peel* contains a considerable quantity of astringent matter.

A FIG is a most delicious fruit, the produce of a tree of the same name. Figs are of several kinds; the black and violet colored are the worst; the white are esteemed the best. They are dried either by an oven or the sun, and in this state they are used both as medicine and food. The best figs are the produce of Italy, Spain, Provence, &c. The islands of the Archipelago yield figs in great abundance, though inferior in goodness to those of Europe. The Greeks in those islands cultivate them with wonderful care and attention, making them their principal food, and a considerable part of the riches of the country. Figs are gathered in autumn, and generally laid on a rack or hurdle to dry in the sun. They are found to contain mucilage, sugar, and some oil. They are very nourishing; yet, when eaten freely, they often produce much inconvenience. They are used to make pargarisms against disorders of the throat and mouth; they are also applied externally to soften and promote the maturation or suppuration of tumors, particularly when *toasted* and applied to swelled gums.

BANIAN, or INDIAN FIG TREE. This tree deserves notice, not as a fruit tree, but from its being a sacred tree with the Hindoos in

the East Indies, from the vast size it attains, and from the siugularity of its growth. The fruit does not exceed that of a hazle nut in bigness; but the lateral branches send down shoots which take root, till, in the course of time, a single tree extends itself to a considerable grove. This remarkable tree was known to the ancients. Strabo mentions, that after the branches have extended about twelve feet horizontally, they

THE BANIAN TREE.

shoot down in the direction of the earth, and there take root themselves; and when they have attained maturity, they propagate onward in the same manner, till the whole becomes like a tent supported by many columns.

Some specimens of the Indian fig tree are mentioned as being of immense magnitude. One near Mangee, twenty miles to the westward of Patna, in Bengal, spread over a diameter of 370 feet. The entire circumference of the shadow at noon was 1116 feet, and it required 920 feet to surround the fifty or sixty stems by which the tree was supported. Another covered an area of 1700 square yards; and many of almost equal dimensions are found in different parts of India and Cochin China, where the tree grows in the greatest perfection.

RAISINS are grapes prepared by suffering them to remain on the vine till they are perfectly ripe, and then drying them in the sun, or in ovens, to fit them for keeping, and for some medicinal or culinary purposes. There are various kinds; as raisins of Damascus, which are brought to us flat and seeded, of the size of the thumb, whence we may judge of the extraordinary bulk of the grape when fresh. Travellers mention bunches that weighed twenty-five pounds. Their taste is faintish and disagreeable. There are numerous other sorts, which are denominated from the place where they grow, &c.; as the raisins of Calabria, Malaga, Muscadine raisins, &c.

About 8000 tons of raisins, or dried grapes, are annually imported

into England, at a duty of about £160,000. A considerable quantity of undried grapes are also imported, principally from Portugal, in jars among saw-dust. The value of those so imported, is about £10,000. The *currants* of commerce, which are so extensively used in England, and of which about 6000 tons are usually imported into that country, are small dried grapes principally from the Ionian islands.

DATES; the fruit of an oblong shape of several kinds of palm trees, which are found in the Levant, Arabia, Persia, and Africa, and parts of South America. The tree is said to be beautiful, shooting up to the height of fifty or sixty feet, without branch or division. When it attains this height, its diameter is from a foot to eighteen inches. The main stems of the leaves are from eight to twelve feet long, firm, shining, and tapering, and each embracing at its insertion a considerable part of the trunk. Before the fruit is ripe, it is rather rough and astringent; but, when perfectly matured, is much of the nature of the fig; has an oblong drupe, or stone, with a deep furrow running longitudinally in the middle of the pulp. Some dates are black, some white, some brown, some again are round, like apples, and very large. They are generally oblong, fleshy, yellow, somewhat larger than the thumb's end, and very agreeable to the taste. Some are no bigger than a pea, and others as big as a pomegranate.

The medullary part of the date tree has the consistency of sago. But the true sago is obtained from another kind of date tree, which is a native of the East Indies. It is the Sago palm, a single trunk of which, in its fifteenth year, sometimes furnishes six hundred pounds of sago. A single acre of land, it is said, will support 435 sago palms, which will annually produce 120,500 lbs. of sago.

There is scarcely any part of the true date tree, which is not serviceable to man, either as a necessary or a luxury. When fully ripened, the fruit yields, by strong pressure, a delicious syrup, which serves for preserving dates or other fruits; or the fruit may be made into jellies and tarts. The stalks of the bunches of dates, hard as they are in their natural state, as well as the kernels, are softened by boiling, and in that condition are used for feeding cattle. By distillation they afford ardent spirit. From the sap, or juice of the tree, is made palm wine. The fibrous parts of the date tree are made into ropes, baskets, mats, and various other articles of domestic use; and so are the strings or stalk, which bear the dates. The cordage of the ships navigating the Red Sea, is almost exclusively of the inner fibrous bark of the date tree. The trunk answers well for posts, railings, and other coarse purposes. Even the leaves of the date palm have their uses. Their great length and compar-

atively small breadth, and their toughness, render them very good materials for the construction of coarse ropes, baskets, panniers, mats, fans, hats, &c. Large quantities of these leaves are annually imported into the United States. It is reported that no less than one million of hats have recently, within a single year, been manufactured in the state of Massachusetts alone.

We shall only add, that the date palm is a very slow growing tree. In a soil and climate most congenial to it, old trees do not gain above a foot in height in five years, so that supposing the increase uniform, the age of a tree sixty feet high, cannot be less than 300 years. In some countries in the East, date trees pass from one person to another, in the course of trade, and are sold by the single tree; and the price paid to a girl's father, on marrying her, often consists of date trees.

PINE-APPLE. This fruit is justly esteemed for the richness of its flavor, as it surpasses all the known fruits in the world. The fruit is supposed to have its name from the cones of the pine tree, which it somewhat resembles. There are many species of pine apples, most of them natives of South America, some of Africa, and one or two of the East Indies, but that most known and propagated, is the *Bromelia ananas*, a native of America. Pine-apples have been long cultivated in the hottest islands of the West Indies, where they are plentiful and good. They have, also, been introduced into European gardens, so as to produce fruit.

APPLE. The apple is distinguished as the fruit of the colder climates. It is at once the most brisk and refreshing of any of the common

hardy orchard fruits. It remains longest in season, is used in the greatest number of ways, and therefore is the most generally cultivated. It is cultivated throughout Europe, as far as the 60th degree of latitude. It has been observed by a distinguished traveller, that the commoner fruit trees, such as apples, pears, cherries, and apricots, grow in the open air, wherever oaks thrive.

The apple is supposed to be a native of the East; whence it was introduced into Europe, and thence into England; from which country it has been brought to the United States. We have, however, an indifferent crab apple, which is indigenous to the country.

The alimentary properties of the apple are not great; but, when fully ripe, they are not unwholesome. In diseases of the breast, says Dr. Willic, such as catarrhs, coughs, consumptions, &c. they are of considerable service; for these beneficial purposes, however, they ought not to be eaten raw, but either roasted, stewed or boiled. With regard to their sensible properties, apples have been divided into spicy, acidulated and watery. The first contain the least proportion of water, are of a most delicate flavor, and on account of their vinous qualities, are not apt to excite flatulence. Pippins, on the contrary, though affording more nutriment, are more fibrous, and consequently more difficult to digest. These belong to the second class. Lastly, those sweet and tender apples, which are very sweet and palatable, are the least fit to be eaten in a raw state, unless with the addition of bread or biscuit.

To preserve apples well, is obviously a great desideratum. Fessenden, from an English journal, recommends the use of dry pit sand. Glazed earthen jars are to be provided, and the sand to be thoroughly dried. A layer of sand an inch thick is then placed in the bottom of the jar; above this, a layer of fruit, to be covered with a layer of sand an inch thick, then lay a second stratum of fruit, covering again with an inch of sand. An inch and a half of sand may be placed over the uppermost row of fruit. The jar is now to be closed and placed in a dry situation, as cool as possible, but entirely free from frost.

On the preservation of apples, the following excellent observations are from the pen of Noah Webster, Esq. "It is the practice of some persons to pick apples in October, and first spread them on the floor of an upper room. This practice is said to render apples more durable by drying them. But I can affirm this to be a mistake. Apples, after remaining on the trees as long as safety from the frost will admit, should be taken directly from the trees to close casks, and kept dry and cool as possible. If suffered to lie on the floor for weeks, they wither and lose their flavor, without acquiring any additional durability. The best mode of preserving apples for spring use, I have found to be, to put them in dry sand as soon as picked. For this purpose, I dry sand in the heat of summer, and late in October put down the apples in layers, with a covering of sand upon each layer. The singular advantages of this mode of treatment, are, 1st, The sand keeps the apples from the air, which is essential to their preservation, and, 2nd, the sand checks the evaporation or perspiration of the apples, thus preserving them in their full flavor; at the same time, any moisture yielded by the apples (and some there will be,) is absorbed by the sand; so that the apples are kept dry, and all mustiness prevented. My pippins, in May and June, are as fresh as

when first picked; even the ends of the stems look as if just separated from the twig."

PEAR. The pear tree is found in a wild state in Europe, as far north as lat. 51°. According to the editors of the Library of Entertaining Knowledge, it is probable that the Romans introduced the cultivated pear into England. From the latter country, as well as from France, many fine varieties have been transferred to America. Some sorts are indigenous to the country.

In a wild state, the fruit of the pear has an austere and unpleasant taste; but when cultivated, it is highly grateful. The relative salubrity of pears, however, depends much on the state of ripeness or immaturity, in which they are used, as well as on their different properties. Unripe pears should not be eaten, and those which are hard, astringent, and difficult of digestion, should also be rejected. As a general rule, the more juicy ones are more alimentary, and less objectionable, from the circumstance that they abound more in saccharine matter, which does not so much oppress the stomach. All the varieties, however, are more flatulent than apples, plums, or the generality fruit. When on the eve of decay, they are especially obnoxious, and likely to produce cholera. Winter pears are, in general, unhealthy; and the more so as they are commonly eaten at a period of the year when the stomach requires stimulating, rather than cooling nourishment. Pears, when managed in a similar manner with apples for making cider, afford a pleasant liquor, known by the name of *perry*.

PLUM. The tree which bears this fruit, is found growing wild in Great Britain, and other parts of Europe; but it is supposed to be a native of Asia. It is also indigenous in North America.

There are nearly three hundred varieties of plums. The origin of one kind, the *Washington*, which in richness of flavor, beauty, and other good qualities, is perhaps not surpassed by any, is too curious to be omitted. The parent tree was purchased in the market of New York, some time in the end of the last century. It remained barren several years, till, during a violent thunder storm, the whole trunk was struck to the earth and destroyed. The root afterwards threw out a number of vigorous shoots, all of which were allowed to remain, and finally produced fruit. It is therefore to be presumed, that the stock of the barren kind is the parent of this. Trees of this kind were sent to several gentlemen in England, a few years ago, by Dr. Hosack, of New York. The fruit appears to be as highly esteemed in England, as in this country.

Besides their utility as a culinary fruit, plums possess valuable medicinal properties. In a dried state, they are called *prunes*, and are eminently useful in cases of costiveness, accompanied by irritation, that would be aggravated by powerful laxatives; but they ought not to be eaten after long fasting, or for supper, unless mixed with other aliment, as they are apt to produce flatulency. With this exception, they suit almost every constitution, and produce both cooling and aperient effects; but when prunes do not operate, their power may be increased by combining them with a small portion of rhubarb or cream of tartar.

If plums be eaten in a fresh state, or before they are perfectly ripe, and in immoderate quantities, they induce colics, looseness, and similar affections in the stomach and intestines. The larger kinds, especially

ought to be used seldom, and with great precaution, being more dangerous than the smaller plums; because the former are rarely permitted to attain their maturity.

PEACH. The peach tree is said to be a native of Persia in Asia, whence it was brought by the Romans into Italy, during the reign of the Emperor Claudius. It was first cultivated in England about the middle of the sixteenth century.

The alimentary properties of the peach are considerable. The better kinds are not only harmless, but often positively beneficial; especially in cases of weakness and derangement of the stomach. In dysenteric complaints, ripe peaches are innoxious, and even salutary. They are also useful for children at the period of teething. Peaches which ripen late have fewer good properties than those which are more early; and, in general, the free-stone peach is better flavored than the cling, though to this there are exceptions.

Peaches are often dried, in which state they will keep for a long time, and are exceedingly fine when stewed. In this state they are also sometimes used for pies.

NECTARINE. This, by some writers, is considered as the same fruit with the peach. It has, however, a smoother skin and firmer pulp. It is, when of a good sort, and properly cultivated, thought to be superior to it. Few vegetable productions are more grateful to the palate, even of the epicure.

APRICOT. The native country of the apricot appears to be Asia, where it is widely diffused. Some writers, however, think it a native of Africa, whence, they say, it was carried towards the north. The tree was first brought into England in 1524, by Wolf, the gardener to Henry VIII.

From the vinous and saccharine nature of this fruit, we may readily conclude that it is possessed of antisceptic, cooling and nutritive properties; yet, unless fully ripe, it is apt to ferment and turn acid, in weak stomachs, especially those of persons who are subject to flatulency, and eructations: hence apricots ought to be eaten in moderation, with the addition of a little bread, and rather before than after meals. In short, they are more useful to bilious and plethoric, than to phlegmatic and hysterical individuals, or those troubled with hypochondrical complaints.

CHERRY. The cherry tree is said to have been originally found in Persia, whence it was introduced into Italy, as well as other parts of Europe, and is supposed to bave been brought from Flanders into England, in the reign of Henry VIII. There are several varieties in the United States, which are thought to be natives of the country. The common red cherry, which, until within a few years was almost the only sort cultivated among us, is quite indifferent; and, when eaten immoderately, is apt to produce colic, and other kindred diseases. The better sorts afford a refreshing summer fruit, highly grateful at the dessert, and excellent for pies, tarts, &c. A fine wine is made from the juice, and a spirit may be distilled from the fermented pulp. The gum which exudes from the tree is equal to Gum Arabic; and Hasselquist relates that more than two hundred men, during a siege, were kept alive for nearly two months,

without any other sustenance than a little of the gum, taken sometimes into the mouth and suffered gradually to dissolve.

QUINCE. The quince was introduced into Europe, according to Pliny, from the island of Crete. From the largeness of this fruit, and its splendid color, it is thought not improbable that it was the same with the apples of the Hesperides.

In the south of France, particularly on the borders of the Garonne, the quince is very extensively grown; and the peasants prepare from it a marmalade, which they call *cotignac*. The term marmalade is derived from the Portuguese name for the quince, *marmelo*. Gerard says, that in his time, quince trees were planted in the hedges of gardens and vineyards; and marmalade, two centuries ago, seems to have been in general use, principally from a belief that it possesses valuable medicinal properties. The seeds of the quince are still used in medicine, on account of the great quantity of mucilage, which they yield to boiling water. The fruit is sometimes boiled and eaten with sugar, in which form it may be usefully employed in cases of dysentery. Five gallons of the juice of quinces, mixed with twenty-five pounds of sugar, and fermented, affords a delicious wine. Quinces are excellent in apple pies, in the proportion of one fourth quince to three fourths apple, with some thin slices of candied lemon peal or citron.

## SECTION III.

### DRINKS.

Concerning drinks, it may be observed, in general, that they are necessary to dilute and to assist the digestion and assimilation of the food, to preserve the fluidity of the chyle and of the blood; and, on many occasions, directly to replace the large quantity of watery fluid, dissipated by the cutaneous, pulmonary, and urinary secretions. Accordingly, if the stomach be oppressed by the solidity or acrimony of the food; if the circulating mass require dilution; or if there have been any extraordinary dissipation of the fluids, by their different excretories, we are advertised of the necessity of taking drink by the appetite of *thirst*.

WATER. Water was formerly supposed to be a simple body, and was called one of the elements. But the researches of modern chemistry have proved beyond a doubt, that it consists of *hydrogen* and *oxygen*. When two volumes of hydrogen gas are mixed with one volume of oxygen, and the mixture inflamed in a proper apparatus, by the *electric spark*, the gasses totally disappear, and the interior of the vessel is covered with drops of pure water, equal in weight to that of the gasses consumed.

Pure water is transparent, and without either color, taste, or smell. At the temperature of 40° it is at its greatest density. A cubic foot of water weighs, except a trifling fraction, 1000 ounces; a cubic inch

252,953 grains. A pint of pure water, wine measure, weighs, or is assumed to weigh, sixteen ounces avoirdupois.

At the temperature of 32° water becomes ice; the specific gravity of ice is 0,94; ice of course, floats on water. Water exposed to heat in open vessels, boils at 212°. But water boils at different temperatures, depending upon the pressure of the atmosphere. At the top of Mont Blanc it boiled, according to Saussure, at 187°.

Water is the natural drink of man; and, indeed, of all animals. It is also the most universally used; and though others are taken by a great proportion of mankind, it forms the basis of all of them, considered merely as drinks. It is not only the safest and best drink, but however it may be disguised, water is, perhaps, the only fluid which can answer all the purposes for which drink is required.

WINE is an agreeable, spirituous, aromatic liquor, prepared by fermenting the juices of those vegetables which contain *saccharine* matter.

The *kinds* of wine are extremely various. The difference which exists between them is not, however, so much owing to a distinction in the species of grapes, as in the quality of fruit, produced by the varieties of soil, cultivation, and climate, to which they are subject. This, likewise, depends, in some instances, on the peculiar mode of fermentation, and the state of the grapes from which the wine is produced.

Of all the kinds of wines that are consumed in England, none, it is said, are so much in request as *red port.* This has its name from the city of Oporto, in the neighborhood of which the vines producing it are chiefly cultivated.

The difference in *color* betwixt red and white wines, does not so much depend upon the quality of the grapes, as upon the mode in which the wines are prepared. The juice of red grapes, if carefully pressed, and fermented separately from the skins, forms a white wine. If the skins be pressed so as to discharge the coloring matter, or if they be allowed to remain in the juice, during the fermentation, the wine assumes a red tinge.

*White port*, and Lisbon, are two kinds of white wine, which we receive from Portugal. The latter of which is now chiefly used.

*French wines.* Many excellent wines are produced in France. That which is usually considered the best, is *Burgundy*, a red wine of very delicate flavor, which derives its name from the province where it is made. The wines from the neighborhood or Orleans, however, after having been matured by age, are much like Burgundy. *Claret* is the only French red wine for which there is any great demand in England. It is thin and highly flavored, and is chiefly supplied from the neighborhood of Bordeaux. Some of the red wines of Champaigne are highly prized for their excellence and delicacy, though they occasionally have a pungent and sourish taste.

No French white wine has so much celebrity as *Champaigne.* This is of two kinds; one of which, called *still* or *quiet* Champaigne, has gone through the whole process of fermentation; the other, which has the name of *sparkling* Champaigne, has been bottled before the fermentation was complete; this, consequently, works slowly in the bottle, and

causes the wine, on the drawing of the cork, to sparkle in the glass. *Frontignac* and *Muscadel*, are white wines, the delicious productions of Languedoc.

It would not consist with our limits even to name the varieties of wine which are produced in France. Almost every province has a wine peculiar to itself. The value of the wine crop is estimated at about thirty millions sterling. The department of the *Gironde* alone, produces wine to the value of two millions sterling.

*Spanish wine.* In the environs of Xeres, in Spain, is produced the wine called sherries, or sherry, which, when well prepared, is highly esteemed.

The best and richest sort of sherry, is called Pagarette, from the Spanish word Pago, a district, and particularly applied to this vintage. In one aranzado, (an acre of vineyard,) they plant 1,800 vines at regular distances. It is reckoned a good year if it gives three butts per acre; middling, if two; and bad, if but one; some years, however, it yields four or five. The quantity of sherry wine made annually in this place, is about 40,000 pipes. Some sweet wines are also produced in this neighborhood, of which, the best known, is a sweet red wine, called *vino tinto*, or *Tent wine*.

*Italian wines.* Notwithstanding the ancient celebrity of many of the wines of Italy, by far the greater part of which are now manufactured in that country, are thin and bad. Certain vineyards on Mount Vesuvius, however, still have great celebrity for a luscious red wine called Lachryma Christi.

*German wines.* Germany produces many excellent wines, of which, Tokay, Hock, Rhenish, and Moselle, are the most celebrated. *Tokay* has its name from a town in Hungary, in the neighborhood of which it is chiefly made. The quantity of the wine is so small, that even on the spot it is sold for a very high price. Tokay is certainly a fine wine; but it is no way adequate to the price for which it is sold. Several years ago, it could not be purchased, even in Hungary, for much less than half a guinea of English money, per bottle. Of all the German wines, that which is in greatest demand in England, is Hock. This has its name from the town of Hockstedt, in Suabia, celebrated for a great battle which was fought in its neighborhood, by the French and the allies in 1704. *Rhenish* and *Moselle* are produced chiefly on the banks of the river Rhine and Moselle; and have a cool, sharp taste, and considerable strength. Anterior to the late wars in Germany, there were wines in the cellars of many of the noble and wealthy inhabitants of that country, which were more than a hundred years old, and of such body, as to be uninjured even by that great age.

*Madeira* and *Teneriffe wines.* To the Madeira and Canary islands, we are indebted for some excellent white wines. Of these, *Madeira wine* is considered by far the most valuable, particularly after it has been ripened by conveyance into a hot climate. The number of pipes of Madeira annually made in that island, is about 30,000. The grapes when gathered, are put into wooden vessels, and the juice is extracted by persons treading upon them.

The Canary islands gave name to a rich white wine, which was formerly in great esteem, under the name of Canary sack, and is now usu-

ally called *Malmsey Madeira*. The genuine *Malmsey* wine, which is of sweet and luscious flavor, and rich golden yellow color, is the produce of Malvesia, one of the Greek islands, and thence had originally its name, the French merchants denominating it Vin de Malvesia; but so little is now made, that few persons can possess it. *Teneriffe wine*, when two or three years old, has much the flavor of Madeira; but after this age it sometimes becomes so sweet and mellow, as somewhat to resemble Malaga.

*Cape wines.* There are produced at the Cape of Good Hope, two kinds, peculiarly rich, sweet and delicate wines, called *red* and *white Constantina*. The farm from which they have their names, is situated about eight miles from Cape Town. *Constantina* is in perfection, when about two years old; but when kept six or seven years, it sparkles in the glass, somewhat like wine which has not undergone a perfect fermentation.

Several attempts have been made in the United States, within a few years, to cultivate the grapes of our own country, as well as those of foreign origin, for the purpose of making wine. Hitherto, the quantity has not been great, nor the quality, with some exceptions, superior. Indeed, it is doubtful whether the climate will ever admit of the cultivation of those sorts of grapes which are essential to wholesome wine. Yet it is well known that a different opinion prevails among some. In respect to New England, a writer gives it as his opinion that it can never be the interest of the farmers to raise the vine for the above purpose. "The great objection to its culture," he observes, "for wine is, the deficiency of sugar, or saccharine matter. This defect is so great in our climate, that cultivators are obliged to add a large quantity of sugar to the must, or expressed juice, to give it sufficient body. In the Middle and Southern States, the successful cultivation of the vine seems more probable, and some experiments have even exceeded the expectations of the sanguine. Wine pronounced to be of an excellent quality by Dr. Mease, has been manufactured by Col. Adlum, near Georgetown, who in 1826, states that he realized from two acres and a half, from eleven to twelve hundred dollars, after deducting all expenses. Among the grapes cultivated for this purpose, are the Bland and Catawba. In North Carolina, the Scuppernong grape is in high estimation; and from it, wine has been made, pronounced by good judges, to equal the best Madeira. A single vine has been known to produce eight barrels of wine. Mr. Prince, near New York, has produced excellent wine from the Isabella grape, to which he gives the preference. Wine is manufactured also, in parts of Ohio, Tennessee, and several other states.

*Method of making and fining wine.* In the southern parts of France, they make red wines by treading the grapes, or squeezing them between the hands; after the juice and husks have stood a time, they press them; but for white wine, they press the grapes immediately. When pressed, they tun the *must*, and stop up the vessel, leaving the depth of half a foot or more empty, to give room for it to work. About Paris, and in the northern parts of France, they let the husks and must stand two days and nights for white wine, and at least a week for claret wine, before they tun it. To fine it down, they put shavings of green beech into the vessel. Although the juice of the grape generally contains saccharine

matter sufficient for fermentation, yet it is usual in some countries to accelerate this process by artificial means, such as heat, &c. If, after the first fermentation, certain impurities remain, wine-coopers remove these, by means of isinglass, white of eggs, powders of alabaster, calcined marble, rock-alum, &c. The Grecians promote the fining of their strongest wines by a quantity of sulphur and alum. Some sweeten their wines with raisins of the sun.

*Currant wine.* As this kind of wine is extensively manufactured in the United States, especially in private families, we give the following rule from the Farmer's Guide. To make this wine, gather the currants when fully ripe, let them be picked in fair weather, and with as much expedition as possible; break them well in a tub or vat, (some have a mill constructed for the purpose, consisting of a hopper, fixed upon two lignumvitæ rollers,) press and measure the juice, having first strained it through a woollen cloth; to every gallon of pure currant juice, add two gallons of cold water, then to every gallon of this mixture, immediately put three pounds of good brown sugar, (some think it better with three and one fourth pounds,) stir it well, till the sugar is quite dissolved, and then fill up the cask. If you can possibly prevent it, let not your juice stand over night, as it should not ferment before mixture. Observe that the casks be sweet and clean, and such as never have had either beer or cider in them, and if new, let them be first well seasoned. The casks must not be so full as to work over. Lay the bung lightly on the hole, to keep out flies, &c. In three weeks or a month, the bung hole may be stopped up, leaving only the vent hole open, till it has fully done working; then stop it up tight; and in six months, it will be fit for bottling, or for use. Like other wines, however, it improves much by age.

Wine, as well as ardent spirits, it is well known, contains a large quantity of alcohol. The following table exhibits the proportion of this principle in one hundred parts of the following liquors, and which, for convenience, we insert in this place.

| | |
|---|---|
| Rum, - - - | 54 |
| Brandy, French, - - | 53 |
| Gin - - - | 52 |
| Scotch Whiskey, - - | 54 |
| Port Wine, from - - | 19 to 26 |
| Madeira, " - - | 19 to 24 |
| Currant, - - - | 21 |
| Sherry, Lisbon and Malaga, from | 18 to 20 |
| Claret, from - - | 13 to 17 |
| Tokay, - - - | 10 |

"Nearly all the wines used in this country," observes a writer, "contain a much larger proportion of alcohol, than the above table indicates; as it is well known to be the practice of many dealers in wine, to add brandy, and other articles, to give them more life and a richer color." Indeed, it is stated by a most respectable medical authority, that, "for every gallon of *pure* wine which is sold, there is, perhaps, a pipe, or fifty times the quantity of that which is adulterated, and in various manners sophisticated; the whole, without exception, the source of a thousand disorders, and, in many instances, an active poison, imperfectly disguised."

CIDER. This is a cooling, pleasant, vinous beverage, made by fermenting the juice of apples. The following essay upon the manufacture of it, by Jesse Buel, Esq., we extract from the fifth volume of the New England Farmer, as containing the best view of the subject which we recollect to have seen.

The quality of cider depends on several contingencies, among which, I will enumerate,

1. The species of fruit employed;
2. Soil and aspect of the orchard;
3. Condition of the fruit when ground;
4. The process of grinding, &c.;
5. Management of the vinous fermentation; and
6. The precautions which are taken to prevent the acetous fermentation.

I intend to offer remarks upon each of these divisions. And,

1. *The Fruit.* Apples differ not only in their flavor, color, and time of ripening, but in the proportions of their constituent parts. The most material of these constituent parts are acid, sugar, astringency, vegetable extract and water. The properties of good dessert and cider apples are seldom found united, though they are not incompatible with each other. Table apples are esteemed on account of their bland and aromatic flavor, crisp and juicy pulp, and for the property of keeping long, or ripening late. The characteristics of a good cider apple are, a red skin; yellow and often tough and fibrous pulp, astringency, dryness, and ripeness at the cider making season. "When the rind and pulp are green, the cider will always be thin, weak and colorless: and when these are deeply tinged with yellow, it will, however manufactured, or in whatever soil it may have grown, almost always possess color, with either strength or richness."—(*Knight.*) The apple, like the grape, must attain a state of perfection, or perfect maturity, before its juices develope all their excellence; and as many of our best eating apples do not acquire this maturity until winter or spring, this affords a satisfactory reason why winter fruit is seldom or never good cider fruit. In a dry apple, the essential elements of cider are generally more concentrated, or are accompanied with a less proportion of water, than in a juicy one; of course, the liquor of the former is stronger than that of the latter. Of our best cider apples, ten or twelve bushels of fruit are required for a barrel of juice; while of the ordinary juicy kinds, eight bushels generally suffice.

Very little has been done to acquire a correct knowledge of the relative value of our native apples for cider. Coxe has described and figured one hundred varieties of this fruit, of which about thirty are recommended for cider. Of these thirty kinds, I selected the following for my nursery, as not only being best for cider, but as generally combining the desirable qualities of table fruit, also; viz. the Hagloe and Virginia crabs, Harrison, Campfield, Styre, Yellow Newton and Newark pippins, Priestly, Graniwinkle, Winesap, Carthouse and Cooper's Russeting. We have, undoubtedly, among our indigenous fruits, many kinds of excellent cider apples hitherto unnoticed; and it is very desirable that their properties should be tested, and the result of the investigation made public.

In Great Britain, more attention has been given to this subject. The

specific gravity of the juice of old cider varieties has not only been ascertained by scientific men, and their relative value fixed, but new varieties have been obtained by artificial crossing, surpassing, in richness of juice, any before cultivated. Loudon has given a table of 38 cider apples, in his Encyclopedia of Agriculture. Of these, the following are only known to be in our nurseries, viz. *Redstreak, Wine, Styre, Hagloe crab, *Maiden's Blush, *Count Pendue, *Downton and Orange Pippins, Foxley, Siberian Harvey, Yellow Siberian and *Minshell's Crab. Those with an asterisk are also excellent dessert apples. The seven last named, five of which are new varieties by Knight, I have obtained from Europe, and propagated in nursery. None of the old English cider varieties exceed, in the specific gravity of their juice, 1,079, water being 1,000. Six of Knight's new varieties are over 1,079, and one is 1,091. Knight is of opinion, that with proper varieties of fruit, the defects of almost every soil and aspect might be corrected, and that fine cider might be made in any part of England. In France and Italy, small berried grapes, of a harsh flavor are preferred for wine making, (*Loudon*,) and it will be found that the cider apples recommended by Loudon and Coxe, are under a medium size, and several of them austere and harsh.

2. *Soil and aspect*. The apple, like the grape, is known to take much of its character from the soil on which it grows. The best cider orchards in England, are on a stratum of red marle, which stretches across the island. The soil of Herefordshire, highly reputed for its ciders, is an argillaceous, or clay marle. And Knight says, the strongest and most highly flavored cider which has been obtained from the apple, was produced from fruit growing on a shallow loam, or limestone basis. All the writers upon the subject seem to agree, that calcareous earth should form a component part of the soil of a cider orchard. It appears to have the effect of mitigating the harshness of rough and austere fruits, and of neutralizing the juices of those which are too acid. Coxe says, the soil which grows good wheat and clover, is best for a cider orchard. My observation would induce me also to prefer a dry, and somewhat loose soil, in which the roots, destined to furnish food for the tree, and fruit, may penetrate freely, and range extensively, in search of nutriment. The juices of plants and fruits are always more concentrated when growing on a dry, than on a wet soil. Mint, or other aromatic herbs, is much stronger in the specific virtues of the plant, when grown on a dry soil, and greater in volume, when grown on a wet one. The maple yields the sweetest sap, though less in quantity, on a dry soil. Apples may grow large on a moist alluvion; but the fruit will neither be so abundant, nor so rich, as on a dry soil. The thriftiest trees produce the most wood buds; those less thrifty the most fruit buds. The best aspect for an orchard is one somewhat elevated or undulating, protected from prevailing cold winds—and facing the south, south-east or east.

3. *Condition of the fruit*. Fruit should be used when it has attained its perfect state of maturity, and before it begins to decay, because it then yields the greatest proportion of saccharine matter. The most certain indication of ripeness, says Crocker, is the fragrance of the smell, and the spontaneous dropping from the trees. Each kind of the apple should be manufactured separately, or those kinds only mixed

which ripen at one time, and which experience shall show are not prejudicial to each other. Who would ever think of making a superior wine from an indiscriminate mixture of a dozen kinds of grapes? And yet we seem to expect good cider from an indiscriminate mixture of a dozen kinds of apples. It may be urged that the evil is irremediable, because our orchards, containing these dozen varieties, have been furnished to our hands; and that neither the quantity nor quality of any one kind of fruit renders it an object to manufacture it separately. Is it not time, then, to set about correcting the evil, by selecting only the best kinds for new plantations?

4. *Grinding, &c.* The apples should be reduced, by the mill, as nearly as possible, to a uniform mass, in which the rinds and seeds are scarcely discoverable; and the pomace should be exposed to the air from twelve to twenty-four hours, according to the temperature, before it is pressed. The juices of the rind of fruit, as may be instanced in the orange and lemon, are highly concentrated; and those of the rind of the apple have a material influence, with the aromatic bitter of the seeds, upon the flavor and strength of the liquor.

5. *Vinous fermentation.* This is commonly called *working.* It commences at the temperature of 59° Fah., and cannot be conducted in safety when the heat is over 75°, for a high temperature induces a too rapid fermentation, by which much of the spirit passes off with the disengaged carbonic acid gas, and the acetous or vinegar fermentation begins at 77°. This will show the importance of conducting the vinous fermentation under a proper temperature, which is from 50 to 70° of Fah. To show the chemical effect of the vinous fermentation, it will be proper to repeat that the unfermented juice, or *must*, of the apple, consists of saccharine matter or sugar, vegetable mucilage or extract; astringency or tannin; malic, and a small matter of gallic acid, the principle of flavor, tinging or coloring matter, and water. The sugar becomes the basis, or spirit, of the fermented liquor; the spirit, after vinous fermentation, and the tannin, or astringent matter, preserve it from the acetous fermentation, if the vegetable mucilage, or yeast, is separted when it has performed its office. This vegetable mucilage acts upon the saccharine matter in a manner analogous to yeast upon the wort of the brewer—it causes fermentation, and converts sugar into spirits—by its giving off carbonic acid gas, and imbibing hydrogen; the liquor becomes clear, and part of the mucilage rises to the surface with the disengaged air, in the form of froth, and the residue is precipitated, with the heavier impurities, to the bottom, in the form of sediment or lees. This is the critical period. The liquor may now be drawn off clear. If left longer, the feculent matter or froth, by parting with the gas which renders it buoyant, soon settles and mixes with the liquor, renders it turbid, and as soon as the temperature attains a proper height, causes a new fermentation. This will explain the reason why ciders become harsh and sour on the approach of warm weather in the spring. The elementary principles of sugar, ardent spirits and vinegar, it has been ascertained by the experiments of Lavoisier, are the same; and these substances only differ in the proportion of their component parts, and in the modes of their chemical union. Sugar consists of hydrogen, oxygen and carbon. An increased proportion of hydrogen enters into the composition of ardent spirits, and of oxygen into vinegar. The same agent,

vegetable mucilage, which converts the sugar of the apple into spirits, will convert the spirits into vinegar, under a proper temperature, and aided by the oxygen of the atmosphere. The process of making vinegar is greatly accelerated by exposing cider or wine to the atmosphere, the oxygen of which it imbibes, and which is termed by chemists, the great acidifying principle. Here, again, we see the propriety of professional cider manufacturers, who might be provided with cellars where the temperature could be regulated, and who would carefully rack off the liquor, at the completion of the vinous fermentation.

The vinous fermentation commences and terminates at different periods, according to the condition and quality of the fruit, and the state of the weather. The juice of unripe fruit, if the weather be warm, will begin to ferment in a few hours after it passes from the press; and seldom stops at the vinous stage. The juice of ripe fruit, when the temperature is lower, does not begin to ferment under a week or fortnight, or longer, often continues slowly through the winter, and when made from some of the finer cider apples, is not completed under six or nine months. Indeed, in some cases, the liquor does not become clear under a year, and the sugar is not wholly decomposed under two years; for the whole of the sugar is seldom decomposed during the first sensible fermentation. Knight considers cider at two years old as in the best state for bottling. For until the sugar is decomposed, fermentation insensibly goes on, and the strength of the liquor increases. The like insensible process goes on in wines, and when it is completed, the wines are said to be ripe, and are in their highest state of perfection. (*See M'Culloch.*) Temperature being the same, I think it may be assumed as a rule, that fermentation will be rapid and short, in an inverse ratio to the proportion which the saccharine matter bears to the mucilage and water; and that the vinous liquor will be rich, high flavored, and durable, in proportion as the sugar and astringency preponderate in the must.

6. *Precautions to prevent acetous fermentation.* These are, supposing the previous contingencies to have been favorable, a careful separation of the vinous liquor from the froth and lees—a cool temperature—racking and fining, and artificial means to destroy the fermenting quality of the remaining mucilage.

I have already suggested the importance of drawing off the liquor from the scum and sediment, at the termination of the vinous fermentation. This period may be known by the cracking of the froth in an open cask, or, if in a close one, by the application of the nose or ear to the bung hole. If the fermentation has not ceased, a hissing will be apparent, and the gas given off will give a pungent sensation to the nose. If the liquor is not sufficiently clear, or indications appear of the acetous fermentation having commenced, the cider should be racked into clean strong casks, and fined with isinglass, eggs, or skimmed milk. This operation may be repeated, if found necessary; but it should be performed in clear cold weather. After the first racking, the casks should be kept bunged close, and further rackings be avoided, if possible, as every racking reduces its strength, and much of the spirit escapes with the carbonic acid gas, which is evolved in the fermentive process. The oxygen of the atmosphere, besides, increases the vinegar fermentation. But if these methods fail, resort may be had to the means of impeding the nat-

ural operation of the mucilage or vegetable leaven. This may be done by what is called *stumming*, that is, burning a rag impregnated with sulphur, in the cask into which the liquor is to be decanted, after it has been partly filled, and rolling it so as to incorporate the liquid with the gas; or by putting a drachm or two of sulphate of potash in each cask, which will precipitate and render insoluble the remaining leaven. If the fruit is good, and properly ground, and the cider racked from the fermenting casks at a proper time, most, or all of the subsequent operations will be superseded.

VINEGAR is an agreeable acid liquor, prepared from wine, cider, beer and other liquors, and is of considerable use, both, as a medicine and a sauce. The word is French, *vinaigre*; from *vin*, wine, and *aigre*, sour.

There are four kinds of vinegar known in commerce; that from *wine*, from *malt*, from *sugar*, and from *wood*. This last is called the *pyroligneous acid*, and is now prepared in large quantities in London, by distilling wood in close vessels. It may be obtained eight times the strength of common vinegar, so that it may be diluted by the purchaser at pleasure. It is colorless, and by many considered superior to common vinegar. It is said to be perfectly free from all flavor, save that of the pure acid.

The principal requisites to form good vinegar, are, 1. Contact with the air. 2. A temperature not exceeding 77° of Fahrenheit. 3. The addition of some extraneous vegetable matter, to promote the acetous fermentation; and 4. The presence of *alcohol*.

The vinegar used in the United States is chiefly made from cider. It may be prepared thus: to a quarter cask of good cider, add 4 lbs. of white Havannà sugar, and half a pound of *argol*, or rough tartar, in fine powder; it will be better for the addition of some lees of wine. Expose it to a heat not less than 75° nor more than 80°, with the bung out, twice or thrice a day, draw off a pail full, and after it has stood exposed to the air a quarter of an hour, return it to the bung-hole by a funnel.

Vinegar is sometimes made from whey. The following directions are given by Mr. Gennet, of New York. "After having clarified the whey, it is poured into casks with some aromatic plants, or elder blossoms, as suits the fancy, and exposed in the open air to the sun, when it soon acquires an uncommon degree of acidity."

ALCOHOL. This is said to be an Arabian word, which signifies *antimony*: so called from the usage of the Eastern ladies to paint their eyebrows with antimony, reduced to a most subtle powder; whence it at last came to signify any thing exalted to its *highest perfection*. Alcohol is highly rectified spirits of wine, freed from all those watery particles which are not essential to it. When pure, it consists of hydrogen, carbon and oxygen. It is quite colorless and clear; of a strong and penetrating smell and taste; capable of being set on fire without wick, and burning with a flame, without leaving a residue, and without smoke or soot. It is not known to freeze in any degree of coldness. It is used in those preparations called *elixirs*, *tinctures*, *essences*, *&c.* It is a powerful stimulant and antisceptic. It is this, which in brandy, rum, wine, &c. exhilarates, and which, at length, destroys the constitution of the drunkard. In England, alcohol is procured by distillation from molasses; in

Scotland and Ireland, from whiskey. In the East Indies, *arrack* is distilled from rice; in the West Indies, *rum* from the sugar cane; and in France and Spain, *brandy* from wine; in the United States, *cider brandy* from cider. All these afford alcohol by distillation.

RUM is a spirit obtained by distillation from the fermented juice of the sugar cane, or from molasses, and other coarse saccharine matter in the West Indies. Rum contains a considerable portion of alcohol; but as it contains, in solution, a gross essential oil, which is apt to disagree with some stomachs, it is not so good, considered medicinally, as brandy.

BRANDY is obtained by simple distillation, from real wines, or the fermented juice of grapes. To distil brandy, they fill the still half full of the liquor from which it is to be drawn, and raise it with a little fire, till about one sixth part be distilled, or till they perceive what falls into a receiver is not at all inflammable. Brandy, when first made, is perfectly colorless; the color it has in this country is given to it by burnt sugar. The peculiar taste of brandy is produced by a small portion of some essential oil; whether arising from the wine from which it is distilled, or added afterwards, is not known in this country. On this account, in moderate doses, it is very grateful to the stomach. The greatest part of the brandies in use is prepared in France. Of the French brandies, those of Languedoc and Anjou, whence the well known Cognac brandy, are the most esteemed. Of brandy, either plain or rectified, are prepared various kinds of strong liquors, with the addition of other ingredients, sugars, spices, flowers, fruits, &c. The strength of brandy may be determined by olive oil or tallow, both of which sink in good brandy.

GENEVA, or GIN; the name of a compound water, procured from juniper berries and other ingredients, distilled with malt spirits. The French name of the juniper berry, is *genievre*, from which the word is formed. But our common distillers leave out the juniper berries entirely from the liquor they now make and sell under that name. Our chemists have taught them, that the oil of juniper berries and that of turpentine are very much alike in flavor, though not in price; and the common method of making what is called *geneva*, in London, is with common malt spirit and a proper quantity of oil of turpentine distilled together, with sometimes *angelica root*, and other aromatic vegetables. The Dutch, it is said, still continue the original use of juniper berries, and hence the reason why Hollands is, by many, preferred to English gin. This hot, fiery spirit is too much used by the lower classes of people in its undiluted state as a dram. It is most injurious to their constitution and morals.

ARRACK; a spirituous liquor imported from the East Indies; used by way of dram, and in punch. The word arrack, according to Mr. Lockyer, is an Indian name for strong waters of all kinds, for they call our spirits English arrack. But what we understand by the name arrack, he affirms to be no other than a spirit procured by distillation from a vegetable juice called *toddy*, which flows by incision out of the cocoa nut tree, like the birch juice procured among us. Others are of opinion, that the arrack is a vinous spirit obtained by distillation in the

ALE.—MALT.—BREWING.

East Indies from rice or sugar fermented with the juice of the cocoa tree. The Goa arrack is said to be made from the toddy; the Batavia arrack from rice and sugar; there is likewise a kind of shrub from which arrack is made. By fermenting, distilling and rectifying the juice of the American maple, which has much the same taste as that of the cocoa tree, arrack has been made not inferior to any that comes from the East Indies.

ALE is a popular beverage or drink, made from malt. The *zythum* and *curmi*, mentioned by Tacitus as the beverage of the ancient Germans, are supposed to correspond with our ale and beer.

MALT denotes barley cured, or prepared to fit it for making a potable liquor, under the denomination of beer, ale, &c.

The *manner of making malt*, Sir Robert Murray describes as follows: Steep good barley in a stone trough full of water, till the water be of a bright reddish color, but it may be known when it is steeped enough by other marks, as by the excessive swelling of the grain, and the degree of softness. It is afterwards taken out, and laid in heaps, to let the water drain from it, then turned and laid in a new heap, where it may lie forty hours, more or less. In about fifteen or sixteen hours, the grains put forth roots, which when they have done, the malt must be turned over, otherwise the grains will begin to put forth the blade or spire, which must be prevented. It must now be spread to a depth not exceeding five or six inches, and then turned over and over for the space of forty-eight hours at least. This cools, dries and deadens the grain, when it becomes mellow, melts easily in brewing, and separates easily from the husk. Then throw up the malt into a high heap, and let it grow as hot as your hand can endure it, which it usually does in about thirty hours. This perfects the sweetness and mellowness of the malt. It is now again cooled and turned over, and then laid on a kiln, with hair cloth or wire spread under it, where after one fire, it must have a second, and perhaps a third, before the malt be thoroughly dried. The time during which the grain continues on the malt floor varies according to circumstances; fourteen days is, however, the general average. Malt drinks are either pale or brown, as the malt is more or less dried on the kiln, that which is the least dried tinging the liquor least in brewing, and therefore called pale; whereas the higher dried, and as it were, roasted, makes it of a higher color. High dried malt yields less liquor or beer than low dried or pale malt does, and hence the porter brewers are obliged to use coloring drugs, and many pernicious stuffs, as substitutes for malt, which is too dear to afford deep colored pure malt liquor at the common price of porter.

BREWING is the operation of preparing ale or beer from malt. In brewing, a quantity of water being boiled, is left to cool till it becomes of the temperature of 175° or 180°; or till the face can be seen pretty distinctly in the water. Mix the malt with the water, stirring it during the process with the mashing stick. Reserve a few handfuls of the dry malt to strew over the surface after it is mixed, to prevent the escape of the heat; the vessel should also be covered beside with cloths, in order to keep the mixture hot; this operation is called *mashing*. Let the whole stand for three hours, more or less, according to the strength of the wort, which is then to be drawn off into a receiver. The mashing is

repeated for the second wort nearly in the same manner as for the first. After these worts are run off, a quantity of hops is added, and the liquor is again boiled. The hops are afterwards strained from it, and when it is moderately cool, the barm or yeast is applied. The barm causes the whole to ferment, and when sufficiently fermented it is tunned up in vessels, for use. One, two, three, or more months are necessary to pass, before it will be fit for use. The quantity of malt for making a hogshead, sixty three gallons, of *strong beer*, may be ten bushels; for good ale five bushels are sufficient.

The following account of a London brewing establishment, from the pen of Professor Griscom, will give the reader some idea of the extent to which brewing operations are carried in England. This establishment (Barclay's brewery,) covers about eight acres of ground and manufactured last year (1829) 340,000 barrels of 36 gallons each. The building which contains the vats, and the vats themselves, are enormous. The largest of the latter contain each 4000 barrels. The average number of vats is nearly one hundred. A steam engine of twenty-two horse power is employed in driving the machinery, and about two hundred men are engaged in the various works of the establishment: while it is supposed that the number of persons dependent upon it without, in the sale and transportation of the beer, is three or four thousand. The three coppers in which the beer is boiled, hold each 150 barrels.

Twenty-five gentlemen once dined in one of them; after which, fifty of the workmen got in and regaled themselves. One hundred and ninety pounds of beef steaks were thus consumed in one day, in this novel dining room. The tuns in which the beer ferments, hold 1400 barrels each. The carbonic acid in one of them stood about three and a half feet above the liquor, and poured over the side in a continued stream. A candle is instantly extinguished on being placed near the outer edge of this receptacle, and on holding one's face over it, a sharp, pungent sensation is felt in the mouth and fauces, not unlike that produced by ardent spirits. An immersion for a few moments, would be sufficient to occasion a suspension of voluntary motion.

One hundred and sixty horses are kept on the premises, for the purpose chiefly of transporting the materials to and from different parts of the city.

HOPS, it is said, preserve malt liquors; if hops were not added, that clammy sweetness, which the liquor retains after working, would soon become acid, and render the liquor unfit for use. The whole virtue of the hop resides, it appears, in a fine yellow powder readily separable from the leaves by mere rubbing, or threshing; this powder is called *Lupulin.*

## SECTION IV.

### CONDIMENTS.

GINGER, the common, is a native of the East Indies, but now naturalized in the West Indies, whence we are chiefly supplied with it. It

is a perennial shrub, which grows about a yard high. Its propagation is effected by parting the roots in the spring, planting them in pots of light earth, and placing them in a hot bed of tanner's bark, where they remain. The different kinds of ginger found in the shops appear to be the same root differently dried, or otherwise prepared; the roots which are white, soft, and woolly, are in general less pungent than the more solid and compact kinds. Ginger is much employed as a condiment, and as a medicine. It is considered as a useful stimulant in dyspepsy, gout, and other complaints, requiring exciting medicines. Ginger is sometimes brought to this country preserved in syrup. It is also used as a plaster, wet with French brandy, to be laid upon the stomach, in cases of great pain, or to check excessive vomiting in cholera; and often subserves an excellent purpose.

NUTMEG is the product of a tree, which resembles the cherry tree in growth and size, and is a native of the Molucca Islands, from which except Banda, by the policy of the Dutch it has been nearly extirpated: Banda, now supplying with mace and nutmegs, the whole of Europe. The flowers which are inodorous, are present at the same time with the fruit, and male and female are on the same, and on separate trees. Nutmegs are enclosed in four different covers. The first a thick husk, like that of our walnuts. Under this lies a thin reddish coat, of an agreeable smell, and aromatic taste, called *mace*. This wraps up the shell, and opens in proportion as the pod grows. The shell, which makes the third cover, is hard, thin and blackish; under this is a greenish film, of no use; and in this is found the nutmeg, which is properly the kernel of the fruit. The nutmeg tree yields three crops annually; the first, which is the best, in April; the second in August, and the third in December. The fruit requires nine months to ripen; when gathered, the outer covering is first stripped off, and then the mace carefully separated and dried; the nutmegs in the shell are next exposed to heat, and smoke for three months, then broken, and the kernels thrown into a strong mixture of lime and water; after which, they are cleaned and packed up. This process is said to be necessary for their preservation, and with the same intention, the mace is sprinkled with salt water.

The CLOVE is obtained from a tree, somewhat in the form of a nail; whence the term *clove*, from the French *clove*, a nail. The clove tree was anciently very common in the Molucca islands; at present, cloves are chiefly obtained from Amboyna, the Dutch having from their cupidity, dug up the trees in the other islands. It is now, however, cultivated in the isles of France, at Cayenne, and in the island of Dominica, in the West Indies. The tree is very large; its bark resembles that of the olive tree, and its leaves those of the laurel, its fruit falling, takes root without any culture, and eight years after bears fruit. The clove is the unexpanded flower. At Amboyna, they are collected from October to December, when they begin to redden. They require to be dried quickly; on which account, they are first immersed in boiling water and then exposed to smoke and heat; the drying is afterwards finished in the sun. Although the unopened flowers, and even the leaves, are extremely aromatic, the real fruit, which is a coriaceous berry, is not so. Cloves are hot, stimulating aromatics, which affect the breath, eyes, and head, and are useful in palsies, &c. There is an oil drawn

from cloves by distillation; it is sometimes used as a remedy for the tooth-ache, but very improperly, since from its pungent quality, it is apt to corrode the gums and injure the adjacent teeth. When the tooth is carious and will admit of it, a bruised clove is much to be preferred. Much, however of the oil of cloves, which is sold, is said to be obtained from allspice.

PEPPER, or rather *black pepper*, is well known from its general use. It is the produce of a climbing plant, or vine, growing in several parts of the East Indies, chiefly Java, Sumatra, Malacca, and the coasts of Malabar. It is propagated in Sumatra, by cuttings, or suckers; in growing, it is supported by props. The plant is three years old before it bears fruit; it yields two crops annually, the first in December, the second in July. *White pepper* is the fruit of the same plant, perfectly ripe, and freed from its outer coat by means of a preparation of lime and mustard-oil, applied before it is dried.

The CAYENNE PEPPER, or *bird pepper*, brought from the West Indies, is very useful as a condiment, particularly with fish; and latterly it has been introduced into medicine in the shape of a *tincture*, which is a useful stimulant in dyspepsy, &c.

JAMAICA PEPPER, or *pimenta*, is the fruit of an evergreen tree, rising sometimes fifty feet in height. It grows plentifully in Jamaica and other American Islands. It is aromatic, and may supply the place, both of cloves, nutmeg, and cinnamon, whence it is called by the English, *allspice.* The essential oil of pimenta, contains the principal virtues of the berry; it is so much like oil of cloves, as to be often mistaken and sold for it.

CASSIA, or *cassia cinnamon*, is the bark of a species of bay tree, growing in Malabar, Ceylon, Sumatra, and Java. It has many of the habits of the cinnamon tree, and is barked in the same manner. Cassia cinnamon is chiefly distinguishable from the true cinnamon, by being of a lighter color than that article; by being also thicker, by breaking shorter, and by having less bitterness in its taste, as well as very frequently when chewed becoming mucilaginous in the mouth; this last, however, is not an invariable accompaniment.

CINNAMON is the bark of a tree growing in abundance in the islands of Ceylon, and also in Malabar, Cochin China, Sumatra, and other East India islands. It is also now cultivated in the Brazils, the Mauritius, and Guiana. It seldom rises above thirty feet high. Ten varieties of this tree have been enumerated; of these, that called the *sharp sweet cinnamon*, is said to be the best. It is raised from the seed. The chief part of the cinnamon in this country, is brought from Ceylon. The principal difference between cinnamon and cassia consists in the former being thinner, and in more irregular masses, and also in its having much more astringency, and therefore in substance is preferable to cassia.

SALT, COMMON SALT, *muriate of soda*, or *chloride of sodium*, by the most correct and recent nomenclature, is a saline crystallization, used to season and give pungency to various kinds of food; as well as to preserve it on numerous occasions from putrefaction. Salt is obtained from three different sources, namely, the *water of the sea*, *mines*, where it exists in a solid form, called *rock salt*, and from *saline springs*. *Rock*

*salt* is found in various places; at Nantwich in Cheshire, at Cracow in Poland, and in Hungary, Catalonia, in Africa, Asia, and in America, forming hills or very extensive beds above the surface.

*Rock salt*, it is said, was entirely unknown to the ancients. The Polish mines near Cracow, were discovered in 1251; their depth and capacity are surprising. Within them is found a kind of subterraneous republic, which has its polity, laws, families, &c.; even public roads, carriages and horses, for the conveyance of salt to the mouth of the quarry, where it is taken up by engines. These horses, when once down, never see the light again; but the men take frequent occasions of breathing the village air. When a traveller arrives at the bottom of this strange abyss where so many people are interred alive, and where so many are even born, and have never stirred out, he is surprised with a long series of lofty vaults, sustained by huge pilasters, cut out with chisels; and which, being themselves rock salt, appear by the lights of flambeaux, which are incessantly burning, as so many crystals or precious stones of various colors, casting a lustre which the eye can scarcely bear. One of the chief wonders of the place is, that through these mountains of salt, and along the middle of the mine, runs a rivulet of fresh water, sufficient to supply the inhabitants. As soon as the massive pieces are got out of the quarry, they break them into fragments fit for the mills, where they are reduced to a coarse powder, to be used as a culinary salt. There are four kinds, white, bay, red, and brilliant; the last is the *sal gemmæ* of the druggists, but not known in this country. All these become white when pulverized, though they appear of different colors in their natural state.

Salt is obtained from sea water by different methods. At Lymington, in Hampshire, England, the sea water is admitted into large reservoirs, where, being exposed to the air, a part of the water evaporates; the remaining liquor is then transferred to boilers, where the water is still further evaporated by artificial heat, and then set by to cool and crystallize. The water which remains after the crystallization of the salt, is called *mother water*. It contains, or is said to contain *sulphate of magnesia*, or as it is usually called, *Epsom salt*, a well known purgative salt; from this source it is, that most, if not all the Epsom salt found in the shops, is obtained by mere evaporation. From the same is also obtained the common *magnesia* of the shops. This is what is publicly known of the method of obtaining Epsom salt, but it is believed that the manufacturers keep the real process a secret.

Besides the salt obtained from sea water, in various countries, much is obtained from the *rock salt* produced from mines, and a good deal is also produced from *brine springs.*

In the United States, salt is manufactured, but not very extensively, from sea water. Large quantities are made from brine springs. The principal springs are to be found in the state of New York, in the counties of Onondaga, Cayuga, Seneca, Ontario, Niagara, Genesee, Tompkins, Wayne, and Oneida. Those of Onondaga are the most valuable. In 1823, 606,463 bushels were manufactured in this latter county. In 1800, there were not less than 50,000 bushels manufactured. Forty-five gallons of water make a bushel of salt. At Nantucket, 350 gallons of sea water are required. The following approximated analysis of the

water of a spring in New York, is given by Dr. Noyes, of Hamilton College. Forty gallons, 355 lbs., contain 56 lbs. of saline extract.

| | | |
|---|---|---|
| Pure Muriate of Soda, | 51 lbs. | —oz. |
| Carb. Lime, colored by oxide of iron, | — | 6¼ |
| Sulp. of Lime, | 2 | 4 |
| Muriate of Lime, | 1 | 12¼ |

and probably muriate magnesia and sulphate of soda.

The village of Salina and other neighboring places, are the chief places where salt is extensively manufactured. The mode of evaporation is different at different places—sometimes by boiling, and again by exposure to the atmosphere. "At Salina, the mode adopted," says the Northern Traveller, "is that of boiling; and a brief description will convey a clear idea of the process. Each building contains sixteen or eighteen large iron kettles, which are placed in two rows, forming what is called 'a block.' They stand about three feet higher than the floor; and under them is a large furnace, which is heated with pine wood, and requires constant attention, to keep the water always boiling. The water is drawn from a large reservoir, at one end of the building, after having been allowed to stand awhile, and deposit the impurities it has brought along with it. A hollow log, with a pump at one end, and furnished with openings against the kettles, is the only machine used in filling them. The first deposite made by the water, after the boiling commences, is a compound of several substances, and is thrown away, under the name of 'Bittern;' but the pure white salt which soon after makes its appearance, is carefully removed, and placed in a store room, just at hand, ready for barreling and the market.

"Each manufactory yields about forty bushels a day, and the different buildings cost about half a million.

"There are two large manufactories here, where salt is made in reservoirs of an immense size, and evaporated by hot air passing through them in large pipes. The reservoir of the principal one contains no less than 40,000 gallons. The pipe is supplied with heat by a furnace below, and the salt is formed in large loose masses, resembling half thawed ice. The crystallization, also, is different from that produced by the other modes, at least in secondary forms."

As a *condiment*, common salt is of all others the safest, best, and most extensively employed. It is used by all nations; and, indeed, in some shape or other, by almost all animals whatever. It seems in a peculiar manner designed to assist in the digestion and assimilation of our food. In the quantity in which it is usually taken, there is no reason to doubt that many of our aliments become thereby more wholesome and digestible, as well as more agreeable. Like the other condiments, however, in larger quantities it is injurious to the constitution. It occasions heat and thirst, and seems rather to impede than to assist digestion. Besides the usual culinary preparations, in which salt is advantageously employed, it is used also as an antisceptic, to preserve aliments from spontaneous decomposition, and particularly to prevent the putrefaction of animal food. In general, however, the large quantity of salt which is necessarily employed in this way, injures the alimentary properties of the meat; and the longer it has been preserved, the less wholesome and digestible does it become. It is this kind of food, salted flesh and fish,

which so surely occasions that disease called scurvy, amongst sailors and others who are deprived of fresher and more wholesome aliment. Meat, however, which has not been too long preserved, simply pickled, or *corned* meat, as it is called, is but little injured, or decomposed, is still succulent and tender, easily digested, nourishing, and wholesome enough.

Salted and hung meat, and therefore all sorts of hams, are more indigestible and less nutritive. Sparingly used with other food, they communicate, indeed, to it an agreeable relish, and prove a stimulus to the stomach, but their freer and more frequent use cannot be wholesome.

They require, in general, all the powers of the most robust stomachs. It is worthy of remark, in this place, that the fat of animals seems less injured, as an aliment, by salting than the lean parts. Bacon, therefore, though long preserved, is still a very nourishing aliment; though not easily digested.

MUSTARD. There are cultivated two species of this plant, the *black*, and the *white*; both annuals, and both natives of Great Britain.

The seed of the white mustard is celebrated for its medicinal virtues, being at once a tonic and an aperient; cleansing the stomach and bowels, and bracing the system at the same time. The following are the directions given by Loudon for its cultivation. For spring and summer consumption, sow once a week or fortnight, in dry, warm situations, in February and March, (of course later in the United States,) and afterwards in any other compartment. In summer, sow in shady borders, if it be hot, sunny weather; or have the beds shaded. Generally, sow in shallow, flat drills, from three to six inches apart; scatter the seeds thick and regular, and cover in thinly with the earth about a quarter of an inch.

Black mustard is a larger plant than the white, with much darker leaves, and their divisions blunter. It is cultivated chiefly in fields for the mill and for medicinal purposes. It is sometimes, however, sown in gardens, and the tender leaves used as greens, early in the spring.

To raise seed for flour of mustard, &c., sow either in March or April, in any open compartment; or make large sowings in fields, where designed for public supply. Sow moderately thick, either in drills, from six to twelve inches asunder, or broad-cast and rake or harrow in the seed. When the plants are two or three inches in the growth, hoe and thin them moderately, where too thick, and clear them from weeds. They will soon run up in stalks, and in July or August return a crop of seed ripe for gathering.

KETCHUP, is a sauce which derives its name, it is said, from a Japanese word, *kit-jap*. It is made, or ought to be made, from the juice of the mushroom. Wild mushrooms, from old pastures, are generally considered as more delicate in flavor, and more tender in flesh, than those raised in artificial beds.

## SECTION V.

### ANIMALS.

**DOMESTIC ANIMALS.** For an account of neat cattle, horses, sheep, and swine, together with the proper mode of rearing and managing them, &c. see part V. Art. *Agriculture.*

In respect to other animals, it will not comport with the design of this work to give a minute and extended account. Yet, as it might otherwise be thought quite incomplete, we shall proceed to notice a few of the most interesting animals found on the globe, without confining ourselves exclusively to those which are used as *aliments.* We begin with the

LION. This noble animal is far from being as large in size as many others. His ordinary height is between three and four feet, and his length six feet. Some are still larger. His head, neck and shoulders, are large, while his hinder parts are comparatively thin and small. His strength and courage are such, as to entitle him to the appellation of "King of Beasts." The only animals which ever seriously pretended to cope with him, are the elephant, tiger and rhinoceros. The color of the lion is a reddish yellow; his mane is somewhat darker, and often approaches to black. He is found in most parts of Africa, and the southern parts of Asia; but is more common in the former than in the latter. The lioness is one third smaller than the male; but in disposition is more ferocious. The lion requires from twelve to twenty pounds of food every day. He lives chiefly upon the flesh of animals; and in a wild state, generally takes his prey by night.

Many interesting anecdotes are related of the lion. The following, is an account of an engagement which recently took place between a lion and two tigers in the tower of London:—

"Between eleven and twelve o'clock yesterday morning, as the man whose duty it is to clean the wild beasts at the tower, was in the execution of that office, he inadvertently raised a door in the upper tier of cells, which separated the den of a huge lion, from one in which there were a Bengal royal tiger and tigress. At sight of each other, the eyes of the animals sparkled with rage. The lion instantly erected his mane, and with a tremendous roar, sprang at the tiger. The tiger was equally eager for the combat, and in a paroxysm of fury, flew at his assailant, whilst the tigress fiercely seconded her mate. The roaring and yelling of the combatants resounded through the yards, and excited in all the various animals the most lively demonstrations of fear or rage. The timid tribes shivered with dread, and ran round their cages, shrieking with terror, whilst the other lions and tigers, with the bears, leopards, panthers, wolves, and hyenas, flew round their dens, shaking the bars with their utmost strength, and uttering the most terrific cries. The lion fought most bravely, but was evidently overmatched, having to contend with two adversaries, not more than a year from the woods, whilst he had been upwards of seven years in confinement. Still the battle raged with doubtful success, until the tiger seized the lion by the throat, and flung him on his back, when, after rolling over each other several times, the exasperated tigress pinned her enemy against the veranda. In that situation, the prostrate lord of the forest still struggled with an indomitable spirit, roaring with agony and rage. By this time, however, some iron rods had been heated, the red hot ends of which were now applied to the mouths and nostrils of the infuriated tigers,

who were by this means forced to relinquish their grasp; but no sooner was the separation effected, than the lion and tiger seized in their mouths, the one the upper, and the other the lower jaw of his antagonist, biting and tugging at each other with deadly fury. So excited was their animosity, that it was with great difficulty, by the insertion into their nostrils of the glowing iron, they could be disengaged, and the lion driven back to his cell, the door of which was instantly closed upon him. The battle lasted full half an hour. The tiger, in the last onset, lost one of his tusks, but the poor lion was very severely punished."

In a work entitled "Researches in South Africa," published by the Rev. Dr. Philip, is given an account of an adventure with a lion, so curious, that we extract it without abridgement.

"Our wagons, which were obliged to take a circuitous route, arrived at last, and we pitched our tent a musket shot from the kraal; and after having arranged every thing, went to rest, but were soon disturbed; for about midnight, the cattle and horses which were standing between the wagons, began to start and run, and one of the drivers to shout, on which every one ran out of the tent with his gun. About thirty paces from the tent stood a lion, which, on seeing us, walked very deliberately about thirty paces farther, behind a small thorn bush, carrying something with him, which I took to be a young ox. We fired more than sixty shots at the bush, and pierced it stoutly, without perceiving any movement. The southeast wind blew strong, the sky was clear, and the moon shone very bright, so that we could perceive every thing at that distance. After the cattle had been quieted again, and I had looked over every thing, I missed the sentry from before the tent, Jan Smit, from Antwerp, belonging to the Groene Kloof. We called as loudly as possible, but in vain,—nobody answered; from which I concluded that the lion had carried him off. Three or four men then advanced very cautiously to the bush, which stood right opposite the door of the tent to see if they could discover any thing of the man, but returned helter skelter, for the lion, who was there still, rose up and began to roar. They found there the musket of the sentry, which was cocked, and also his cap and shoes.

"We fired again about a hundred shots at the bush, (which was sixty paces from the tent, and only thirty paces from the wagons, and at which we were able to point as at a target,) without perceiving any thing of the lion, from which we concluded that he was killed, or had run away. This induced the marksman, Jan Stamansz, to go and see if he was there still or not, taking with him a fire-brand. But as soon as he approached the bush, the lion roared terribly, and leaped at him; on which he threw the fire-brand at him, and the other people having fired about ten shots, he retired directly to his former place behind that bush.

"The fire-brand which he had thrown at the lion, had fallen in the midst of the bush, and, favored by the strong south-east wind, it began to burn with a great flame, so that we could see very clearly into and through it. We continued our firing into it; the night passed away, and the day began to break, which animated every one to aim at the lion, because he could not go from thence without exposing himself entirely, as the bush stood directly against a steep kloof. Seven men

posted at the farthest wagons, watched him to take aim at him if he should come out.

"At last, before it became quite light, he walked up the hill with the man in his mouth, when about forty shots were fired at him, without hitting him, although some were very near. Every time this happened, he turned round towards the tent, and came roaring towards us, and I am of opinion, that if he had been hit, he would have rushed on the people and the tent.

"When it became broad day-light, we perceived, by the blood and a piece of the clothes of the man, that the lion had taken him away and carried him with him. We also found behind the bush, the place where the lion had been keeping the man, and it appeared impossible that no ball should have hit him, as we found in that place several balls beaten flat. We concluded that he was wounded, and not far from this. The people therefore requested permission to go in search of the man's corpse, in order to bury it, supposing that by our continual firing, the lion would not have had time to devour much of it. I gave permission to some, on condition that they should take a good party of armed Hottentots with them, and make them promise that they would not run into danger, but keep a good look-out, and be circumspect. On this, seven of them, assisted by forty-three armed Hottentots, followed the track, and found the lion about half a league farther on, lying behind a little bush. On the shout of the Hottentots he sprang up and ran away, on which they all pursued him. At last the beast turned round, and rushed, roaring terribly, amongst the crowd. The people, fatigued and out of breath with their running, fired and missed him, on which he made directly towards them. The captain, or chief head of the kraal, here did a brave act, in aid of two of the people whom the lion attacked. The gun of one of them missed fire, and the other missed his aim, on which the captain threw himself between the lion and the people so close, that the lion stuck his claws into the kaross [mantle] of the Hottentot. But he was too agile for him, doffed his kaross, and stabbed him with an assagai. Instantly the other Hottentots hastened on, and adorned him with all their assagais, so that he looked like a porcupine. Notwithstanding this, he did not leave off roaring and leaping, and bit off some of the assagais, till the marksman, Jan Stamansz, fired a ball into his eye, which made him turn over, and he was then shot dead by the other people. He was a tremendously large beast, and had but a short time before carried off a Hottentot from the kraal and devoured him."

TIGER. The Tiger, commonly called the Royal Tiger, is a native of Bengal, of the kingdoms of Siam and Tonquin, of China, of Sumatra, and, indeed, of all the countries of Southern Asia, situated beyond the Indus, and extending to the north of China. This species of animal has long abounded in the above countries, while the Asiatic lion, on the contrary, has only been known within a few years. The average height of the tiger is about three feet, and the length nearly six feet. The species, however, varies considerably in size, and individuals have often been found much taller and longer than the lion. The peculiar markings of the tiger's skin, are well known. On a ground of yellow, of various shades in different specimens, there is a series of black transverse bars, varying in number from twenty to thirty, and becoming

black rings on the tail, the number of which is, almost invariably, fifteen. There are oblique bands, also, on the legs. The pupils of the eyes are circular.

The tiger, like the lion, springs upon its prey from an ambush; and, in most cases, he is easily terrified by any sudden opposition from human beings. A party in India was once saved from a tiger, by a lady, who suddenly opened an umbrella, as she saw him about to spring. Our readers may remember the attack of a tigress upon the horses of the mail, on Salisbury plain in England, a few years ago. The creature had escaped from a travelling menagerie; and, not forgetting her natural habits, sprung upon the leaders as they passed her. The guard would have shot her; but her keepers drove her off, and she escaped to a haystack, under which she crept, and was retaken without difficulty. In narrow passages in Hindoostan, travellers have often been seized by tigers; or a bullock, or horse has fallen a victim to the ferocity of this prowling beast. Horses have such a dread of the tiger, that they can scarcely ever be brought to face him. Hunting him, therefore, on horseback, is a service of great danger. The elephant, on the contrary, though considerably agitated, will stand more steadily, while his rider anticipates the fatal spring by a shot which levels the tiger to the earth. One peculiarity of the tiger, is his willingness to take to the water, either when pursued, or in search of the prey which he espies on the opposite bank of a river.

The PUMA or COUGAR is a native of the American continent, and is principally found in Paraguay, Brazil, and Guiana. He is sometimes seen in the United States, where he is called *panther* or *painter*. He resembles the lion, both in color and voice; but is not as large, and has no mane. Capt. Head, in his "Journey across the Pampas," relates the following interview between a man and a puma:

"The man was trying to shoot some wild ducks; and, in order to approach them unperceived, he put the corner of his poncho (which is a sort of long, narrow blanket,) over his head, and crawling along the ground upon his hands and knees, the poncho not only covered his body, but trailed along the ground behind him. As he was thus creeping by a large bush of reeds, he heard a loud sudden noise, between a bark and a roar: he felt something heavy strike his feet, and instantly jumping up, he saw, to his astonishment, a large puma, actually standing on his poncho; and perhaps the animal was equally astonished, to find himself in the immediate presence of so athletic a man. The man told me he was unwilling to fire, as his gun was loaded with very small shot; and therefore remained motionless, the puma standing on his poncho for many seconds; at last the creature turned his head, and walking very slowly away about ten yards, he stopped and turned again: the man still maintained his ground, upon which the animal tacitly acknowledged his supremacy, and walked off."

The DOMESTIC CAT is found in almost every country on the globe. It is probably a domesticated variety of the wild cat, for when suffered to retire to the woods, it soon becomes wild. A tame cat generally attains the age of twelve years. The food most agreeable to cats is the flesh of animals, or fish; they eat vegetable aliment only from necessity. There are, however, some plants of which they are very fond; of this

nature is the valerian root, and the herb called *nep*, or cat mint. On the other hand, they shun the common rue, as a poison, and any substance rubbed with the leaves of this plant, is said to be perfectly secure from their depredations.

Cats delight in a warm temperature, and a soft couch; moisture and filth, as well as water and cold, are equally repugnant to their nature; hence they are continually cleaning themselves with their paws and tongue. Another peculiarity, is the *purring* of these animals, when they are cajoled or flattered, by passing the hand over their backs; this singular noise is performed by means of two elastic membranes in the larynx, or upper part of the wind pipe. Their hair is so electric, that the expanded skin of a cat makes an excellent cushion for the glass cylinder or globe of an electrifying machine.

The flesh of cats is eaten by several nations; but the substance of the brain is said to be poisonous. From the intestines of these animals, is manufactured the celebrated Roman cords, for covering the violin. They are manufactured out of the guts of rabbits and sheep also; they are cleaned, soaked in water, stretched by a machine, and dried. The name of cat-gut comes from the circumstance of cats being used as food in many parts of Italy, and their guts applied to the making of strings.

With respect to their peculiarities, we shall remark, that cats possess a very acute sense of both smell and sight. By the structure of their eyes, which sparkle in the dark, they are better enabled to discover objects of prey, such as mice and rats, at night, than in the day time; hence, they ought not to be luxuriously fed, if kept for the destruction of these vermin. It is, however, to be regretted, that this useful domestic creature is one of the most deceitful companions, being constantly bent on theft and rapine.

Many persons have so invincible an antipathy against these creatures, that they have been known to faint in rooms where cats were concealed, and no arguments were sufficient to efface the impression.

DOG. Animals of the dog kind are distinguished by their claws, which have no sheath, like those of the cat kind, but adhere to the point of each toe, without the power of being extended or drawn back. Their eyes, also, are not formed for seeing clearly in the dark. By comparing the habits and propensities of the two classes, we shall find, that while the savage selfishness of the cat's disposition prevents it from deriving any pleasure from society, the dog seems to find its gratification increased by associating with the species to which he belongs; and in countries where they are permitted to range with freedom, they are always observed to hunt in packs.

The dog is allowed to be the most intelligent of all quadrupeds; and one that, doubtless, is most deserving of admiration; for, independent of his beauty, his vivacity and swiftness, he gives the most manifest proofs of his attachment to mankind. In his savage state, he may have been a formidable enemy; but to view him at present, he seems only anxious to please; he willingly crouches before his master, and is ready to lick the dust from his feet; he waits his orders, consults his looks, and is more faithful than half the human race. He is constant in his affections, friendly without interest, and grateful for the slightest favor he can receive; easily forgets both cruelty and oppression; and dis-

arms resentment by submissively yielding to the will of those whom he studiously endeavors to serve and to please.

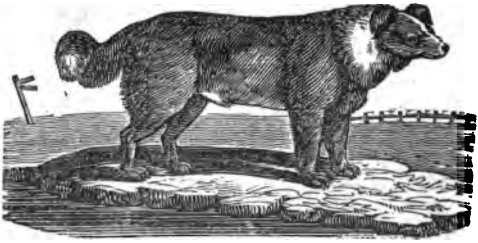
It is said that there are nearly thirty distinct, and well ascertained varieties of the dog. Of these we can notice but a few.

The MASTIFF, the largest of domestic dogs, has a large head, robust body, and lips which hang down on each side of his mouth. This dog was trained by the ancient Britons, to be of use in war. They are now chiefly used as watch dogs, which duty they discharge with great fidelity.

The BULL DOG is smaller than the mastiff, but strongly resembles him. For courage and ferocity, this dog is exceeded by no animal of its size. His antipathy to the bull, from which he derives his name, is remarkable.

The BLOOD-HOUND is larger than the common hound, and is generally of a deep tan or reddish color with a black spot over each eye. They are chiefly used for fox hunting.

The GREY-HOUND is distinguished by his slender and curved body, his narrow muzzle, and tail being curved upwards at the extremity. This kind of dog hunts by sight, and not by scent.—Such is his fleetness, that in a hilly and uneven country, there are few horses that can keep pace with him. He is supposed to outlive all others of the dog species.



The SHEPHERD'S DOG is seldom found in the United States; but in various parts of Europe he is common, especially where sheep are kept in large flocks, and attended by shepherds. The docility and sagacity of the pure breed, indeed, surpass those of every other variety of the canine race; obedient to the voice, looks, and gestures of his master, he quickly perceives his commands, and instantly executes them. A well trained dog of this kind, is, to a shepherd, an invaluable acquisition. The faithful animal anxiously watches the flock, and keeps them together in the pasture; from one part of which it conducts them to another; and, if the sheep are driven to any distance, a well trained dog will infallibly confine them within the road, and at the same time prevent any strange sheep from mingling with them. Should, however, any straggle from the road, he will pursue them, and drive them to the flock, without hurting them in the slightest degree. In Prussia, the shepherds have a kind of dog, which they are able to teach never to bite a sheep, but they will push them forward with their muzzles in the direction in which their masters wish the sheep to go.

SPANIEL. Of this dog there are many varieties. They are so called, probably, because they are of Spanish extraction. They have generally pendulous and woolly ears, with long hair on all parts of the body, but particularly on the breast, beneath the body, and at the back of the legs. In all ages, the spaniel has been noted for fidelity and attachment to mankind.

WATER SPANIEL.—This kind is chiefly useful to sportsmen, in the hunting of water fowl.

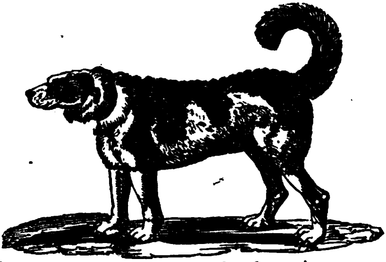
The POINTER is used by sportsmen for discovering game, which he is taught to do with wonderful steadiness and attention. Aided by the acuteness of their smell, pointers generally approach the spot where the game lies: and at length stop, their eyes being steadily fixed upon it, one foot generally somewhat raised from the ground, and the tail extended in a straight line. If the bird runs, the dog discovers it, and steals cautiously after it, keeping still the same attitude; and when it stops, he is again steady.

DOGS.

The SETTER, is a dog nearly allied to the pointer. His scent is more exquisite, and his muscular powers, for size, nearly unequalled.

The TERRIER, is a small and hardy kind of dog, the name of which is derived from its subterraneous employments. He is a great enemy to rats, polecats, and other species of vermin.

The TURNSPIT is a small dog, with short and generally crooked legs, and the tail curled upward. He is used on the continent of Europe, to turn the spit for roasting meat.



The NEWFOUNDLAND DOG is but little smaller than the mastiff. In strength and docility, he exceeds most other kinds of dogs. He is often employed in Newfoundland to draw wood on sledges from the interior of the country to the sea coast, and before the introduction of horses into general use, in Canada, most of the land carriage was performed by dogs. The ease with which he swims, renders him of great service in cases of danger from the oversetting of boats, and other accidents by water.

The SIBERIAN DOG is distinguished by having its ears erect, and the hair of its body and tail very long. He is employed in drawing sledges over the frozen snow, five of them being yoked to each sledge, with the fifth in front as the leader. The fleetness of these dogs is so great, that they have been known to perform a journey of 270 miles, in three days and a half; and, with a sledge containing three persons and their baggage, they will travel sixty miles in a day. During the most severe storms, when their master cannot see his path, or even keep his eyes open, they seldom miss their way. And it is said that in the midst of a long journey, when it is found absolutely impossible to proceed any further, the dogs, lying round their master, will keep him warm and prevent him from perishing by the cold.

Of the numerous anecdotes which we might relate, of the sagacity and fidelity of the dog, we have room for but one illustrative of the latter characteristic of this sometimes noble animal.

"A French merchant, having some money due from a correspondent, set out on horseback to receive it, accompanied by his dog; and hav-

ing settled the business to his satisfaction, placed it in the bag that contained his clothes. Finding himself rather fatigued with his journey, he resolved to repose under a hedge, and untying the bag, from the front of his saddle, placed it carefully under his head.

"After having remained some time in this situation, he found himself entirely recovered from fatigue; and, wholly absorbed in some pleasing reflections, he re-mounted without even a thought of the bag. The dog, who had witnessed this mark of inattention, attempted to recall his recollection by barks and screams; and finding the bag too heavy for his utmost exertions, ran howling after him, and caught the horse by the heels. Roused by this mark of what he thought *sudden madness*, he resolved to watch the animal's motions when he approached a stream, and perceiving that he did not attempt to quench his thirst, as usual, was absolutely confirmed in the belief that he was mad. 'My poor animal,' said the afflicted merchant, 'and must I, in justice take away thy life? alas!' continued he, 'it is an act of necessity, for there is no one to perform the office in my place.' So saying, he drew a pistol from his pocket, but from affection for his favorite, averted his head; the ball, however, performed its embassy, for the dog was mortally wounded, though not dead. The bleeding animal endeavored to crawl towards its master, whose feelings revolted at the affecting sight, and spurring on his horse, he pursued his journey, with the image of his expiring favorite strongly impressed upon his mind. 'How unfortunate I am,' said he mentally; 'I had rather have lost my *money*, than a dog I so much prized!'—when, stretching out his hand, as if to grasp the treasure, neither bag nor money were to be seen. His eyes were instantly open to conviction; 'and what a wretch I have been,' he suddenly exclaimed, 'poor faithful creature—how have I rewarded thy fidelity! Oh, madness of recollection, how severely am I to be blamed!'

"He immediately turned his horse, and set off with the fleetest motion, and soon came to the spot where the proof of his folly was displayed; and every drop of blood that he saw seemed to reproach him with injustice, and every feeling of his heart was severely pained. These sanguinary drops proved a sufficient direction for the faithful creature's footsteps to be traced, and he was found stretched beside the treasure he had been so anxious to take care of, and which had been the primary means of depriving him of life.

"When the merchant beheld him still guarding his possessions, though struggling with death, and agonized with pain, his sensations of remorse were very much heightened; but all hopes of preserving his existence proved vain. The poor animal no sooner perceived his master approaching, than he testified his joy by the wagging of his tail; and absolutely expired in licking the hand which caressed him, as if in token of forgiveness for having taken away his life."

CAMEL. Few animals present more points of interest than the camel. His height is about five and a half feet, and his length about ten. He has long legs, a short, but large body, a long crooked neck, and a small and exceedingly ill shapen head. There are two species of camel, the Bactrian and Arabian. The former of these has two bunches on the back; the latter, which is sometimes called the dromedary has but

one. In general, these two varieties possess the same character and qualities. Their hair is coarse, and usually, their color is alike brown. Of the two varieties, the Bactrian camel is much more rare. This species is found in Turkistan, which is the ancient Bactria, and in Thibet as far as the frontiers of China. The ordinary duration of the camel's life, in Arabia, is said to be forty or fifty years.

The camel is obviously fitted for the countries in which he is found. He possesses uncommon strength, which enables him to carry heavy burdens over arid plains and through trackless deserts, which would otherwise be impassable to the commodities of the East. And, in addition, he has an extraordinary capacity of enduring privation, being able to sustain a march of several hundred miles, with a scanty supply of food, and without any water.

He is provided with a bag or reservoir, in which he may take an ample provision of water to serve him in time of need, having the power to force the liquid back into his first stomach, and even to his mouth, to allay his thirst, and soften, by rumination, the hard and dry herbs, upon which he feeds; the large hump which he has on his back, is a mass of fat, destined to supply the want of food, by absorption. It is through this peculiar structure that the camel has become the inhabitant of flat countries—sandy, sterile, and arid.

Camels are to be found at San Rossora, in Italy. They are the property of the government of Tuscany. The time of their introduction into that country is uncertain. These camels walk at the rate of about three miles an hour, and they travel about thirty miles a day. They are so degenerated, that, from them, no adequate idea can be formed of what the Arabians call the "ship of the desert."

The ordinary load of a camel is six hundred weight; but he will carry a thousand. Mr. Buckingham saw camels carrying mill stones to the large towns on the west of the Jordan, each of which was nearly six feet in diameter; one being laid flat on the animal's back, in the very centre of the hump, and resting on the high part of the saddle, was secured by cords passing under his belly. The camel sometimes carries large panniers or baskets, filled with heavy goods. In these baskets, women and children are often carried.

## THE SWIFT DROMEDARY.

We here present our readers with a view of a swift Dromedary, harnessed, and with his rider upon him. The saddle is placed on the withers, and confined by a band under the belly. It is very small, and it is difficult to sit upon it. This is done by balancing with the feet, against the neck of the animal, and holding a tight rein to steady the hand.

The first experiment which an European makes in bestriding a dromedary, is generally a service of some little danger, from the peculiarity of the animal's movement in rising. The following account is given us by Captain Riley, during his captivity among the Arabs. "They placed me on the largest camel I had yet seen, which was nine or ten feet in height. The camels were now all kneeling or lying down, and mine among the rest. I thought I had taken good hold to steady myself, while he was rising; yet his motion was so heavy, and my strength

THE SWIFT DROMEDARY.

so far exhausted, that I could not possibly hold on, and tumbled off over his tail, turning entirely over. I came down upon my feet, which prevented my receiving any material injury, though the shock to my frame was very severe. The owner of the camel helped me up, and asked me whether I was injured; I told him no. 'God be praised!' said he 'for turning you over; had you fallen upon your head, these stones must have dashed out your brains. But the camel,' added he, 'is a sacred animal, and heaven protects those who ride on him! Had you fallen from an ass, though he is only two cubits and a half high, it would have killed you, for the ass is not so noble a creature as the camel or the horse.' I afterwards found this to be the prevailing opinion among all classes of the Moors and Arabs. When they put me on again, two of the men steadied me by the legs, until the camel was fairly up, and then told me to be careful, and to hold on fast; they also took great care to assist my companions in the same way."

Our readers probably well know, that immense journies are made in the east by means of the camel; and the produce of one country is conveyed to another by merchants, who go in caravans. These caravans sometimes consist of several thousand camels. Occasionally they suffer great distress for the want of water, and are sometimes overwhelmed by the sands of the desert. The following interesting story is related by Buckhardt, of a small caravan which was passing from Berber to Datou, across the Nubian Desert. "It consisted of five merchants and about thirty slaves, with a proportionate number of camels. Afraid of the robber Naym, who at that time was in the habit of waylaying travellers about the well Nedjeym, and who had constant intelligence of the departure of every caravan from Berber, they determined to take a more eastern road, by the well Owareyk. They had hired an Ababde guide, who conducted them in safety to that place, but who lost his way from thence northward, the route being very unfrequented. Af-

ter five days' march in the mountains, their stock of water was exhausted, nor did they know where they were. They resolved, therefore, to direct their course towards the setting sun, hoping thus to reach the Nile. After two day's thirst, fifteen slaves and one of the merchants died; another of them, an Ababde, who had ten camels with him, thinking that the camels might know better than their masters, where water was to be found, desired his comrades to tie him fast upon the saddle of his strongest camel, that he might not fall down from weakness: and thus he parted from them, permitting his camels to take their own way, but neither the man nor his camels were ever heard of afterwards. On the eighth day after leaving Owareyk, the survivors came in sight of the mountains of Shigref which they immediately recognized: but their strength was quite exhausted, and neither men nor beasts were able to move any farther. Lying down under a rock, they sent two of their servants, with the two strongest remaining camels, in search of water. Before these two men could reach the mountain, one of them dropped off his camel, deprived of speech and able only to move his hands to his comrade, as a signal that he desired to be left to his fate. The survivor then continued his route; but such was the effect of thirst upon him, that his eyes grew dim, and he lost the road, though he had often travelled over it before, and had been perfectly acquainted with it. Having wandered about for a long time, he alighted under the shade of a tree, and tied the camel to one of its branches; the beast, however, smelt the water, (as the Arabs express it,) and, wearied as it was, broke its halter, and set off galloping furiously in the direction of the spring, which, as it afterwards appeared, was at half an hour's distance. This man, well understanding the camel's action, endeavored to follow its footsteps, but could only move a few yards; he fell exhausted on the ground, and was about to breathe his last, when Providence led that way, from a neighboring encampment, a Bishayre Bedouin, who, by throwing water in the man's face, restored him to his senses. They then went hastily together to the water, filled the skins, and returning to the caravan, had the good fortune to find the sufferers still alive. The Bishayre received a slave for his trouble. My informer, a native of Yembo, in Arabia, was the man whose camel discovered the spring; and he added the remarkable circumstance, that the youngest slaves bore the thirst better than the rest, and that, while the grown up boys all died, the children reached Egypt in safety."

At particular seasons of the year, camel fights are common at Smyrna and Aleppo. They are led out to a large plain, where they are muzzled to prevent their being seriously injured, for their bite is tremendous, and are let loose, a couple at a time. Their mode of combat is curious; they knock their heads together (laterally,) twist their long necks, wrestle with their fore legs, and seem chiefly intent in throwing each other down. The following cut will give the reader a pretty just idea of a camel fight.

LLAMA. This animal is a native of South America, particularly of the mountainous districts of Chili and Peru, where, it is said, that they abound by thousands and almost by millions. Their heads are small in proportion to their bodies: and are somewhat in shape between the head of a horse and that of a sheep, the upper lip being cleft like that

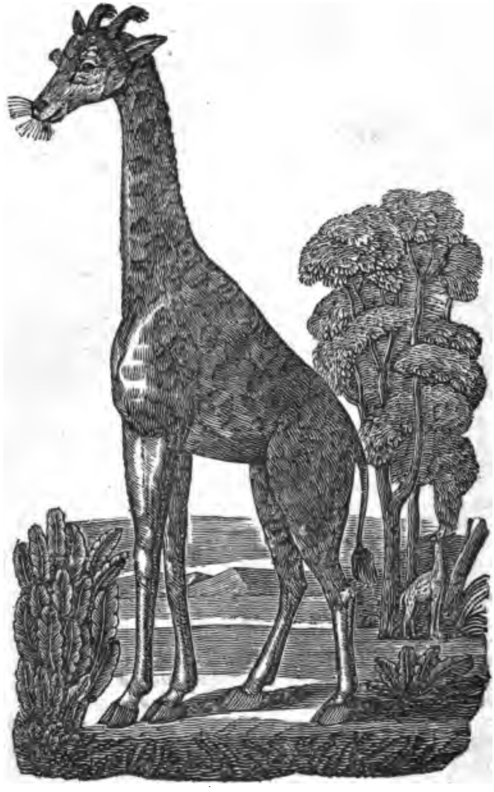
LLAMA.

of a hare, through which they can spit to the distance of ten paces; and if the spittle happens to fall on the face of a person, it causes a red itchy spot. Their necks are long, and concavely bent downwards, like that of a camel, which animal they greatly resemble, except in having no hump on their backs, and being much smaller. Their ordinary height is from four feet to four and a half, and their ordinary burden does not exceed an hundred weight. They walk, holding up their heads with wonderful gravity, and at so regular a pace as no beating can quicken. At night, it is impossible to make them move with their loads, for they lie down till they are taken off, and then go to graze. Their ordinary food is a sort of grass called *yeho*, something like a small rush, but finer, and has a sharp point, with which all the mountains are covered exclusively. They eat little, and seldom drink, so that they are easily maintained. They have cloven feet, like sheep, and are used at the mines to carry ore to the mills; and as soon as loaded, they set off without any guide to the place where they are usually unloaded.

They have a sort of spur above the foot, which renders them sure-footed upon the rocks, as it serves as a sort of hook to hold by. Their hair, or rather wool, is long, white, gray, and russet, in spots. These animals are of great use and profit to their masters; for their wool is very good and fine, particularly of that species named *pacas*, which have very long fleeces:—and they are of little expense for nourishment, for a handful of maize suffices them, and they can go a long time without water. Their flesh is as good as that of the fat sheep in Castile.

There are now public shambles for the sale of their flesh, in all parts of Peru, where the animal is found.

# THE GIRAFFE, OR CAMELEOPARD.



The GIRAFFE, or CAMELEOPARD. There are at present three Giraffes in Europe—one in the King's Menagerie, in Windsor Great Park,—one at the Jardine des Plantes, at Paris,—the third at Venice, which arrived late in 1828; a fourth was sent to Constantinople, but died there. These animals were all presents from the Pacha of Egypt. Till the year 1827, when a giraffe arrived in England, and another in France, the animal had not been seen in Europe since the end of the fifteenth century, when the Soldan of Egypt sent one to Lorenzo di Medici. The absence of the giraffe from Europe, for three centuries and a half, naturally induces a belief, that the descriptions of this animal were in great part fabulous—that a creature of such extraordinary height and apparent disproportions, was not to be found amongst the actual works of nature.

This animal is said to be the tallest in the world, the top of its head being about seventeen feet from the ground, and its body about ten. His size is that of the horse; and, in shape, he resembles the camel. From the manner in which he stands, his fore legs have the appearance of being much longer than his hind legs; yet this is not so. His mouth is quite small. His hoofs, which are cleft, resemble those of the ox. The motions of the head and neck are extremely graceful and curious, possessing the flexibility and usefulness of the neck of the swan and peacock. Its eye is large, prominent, and exceedingly quick at catching objects at a great distance; it is well defended by the brow, and it can see without turning the head, behind and below it. The ears are well formed to receive sounds; and are constantly bent forward. The tongue has very peculiar properties, and can be so tapered as to enter the ring of a very small key. Its taste and smell are very acute and delicate, especially in regard to the artificial food given it. It can raise the little dapillæ at pleasure, for the tongue at times is perfectly smooth, and at others exceedingly rough. It is a small feeder, but drinks about eight or ten quarts of milk in the day. The upper lip is longer than the lower one, which assists the tongue in drawing in boughs; but when grinding its food it is contracted. It has no teeth or nippers in the upper jaw, and the outside ones are divided to the socket; it lies down when it chews the cud.

His defence, as that of the horse, and other hoofed animals, consists in kicks; and his hinder limbs are so light, and his blows are so rapid, that the eye cannot follow them. They are sufficient for his defence against the lion. He never employs his horns in resisting any attack. The Giraffes, male and female, resemble each other in their exterior, in their youth. Their obtuse horns are then terminated by a knot of long hair: the female preserves this peculiarity for some time, but the male loses it at the age of three years. The hide, which is at first of a light red, becomes of a deeper color as the animal advances in age, and is at length of a yellow brown in the female, and of a brown approaching to black in the male. By this difference of color, the male may be distinguished from the female, at a distance.

DEER. Animals of the deer kind, have a head which is elongated, but not very large. The ears are large and pointed, the neck is of moderate length, the body plump, and the limbs slender, though strongly knit. The hair is very similar in color throughout the species of this genus, and is dry and harsh. The young deer or fawns, are mostly spotted with white, upon a brownish yellow ground. The males of this genus are all provided with horns, which are variously branched. The species which we shall notice, are the Moose, American Elk, Rein Deer, and the Virginia or common Deer.

The MOOSE is the largest of the deer kind, and often exceeds the largest horse in size and bulk. In his form, he is not as handsome, nor are his motions as graceful as those of the other species of deer. His head is large, and his horns, which sometimes exceed fifty pounds in weight, are unwieldy. In the summer, the moose frequents swampy or low grounds, near the margin of lakes and rivers, through which he delights to swim, as it frees him for a time from the annoyance of insects. During the winter, in families of fifteen or twenty, they seek

the depths of the forest, for shelter and food. Their flesh, though generally coarser and tougher than other venison, is esteemed excellent food, and the Indians, hunters, and travellers, all declare, that they can withstand more fatigue, while fed on this meat, than when using any other. The skin of the moose is of great value to the Indians, who use it for tent covers, clothing, &c. This animal inhabits the northern parts of both continents. In Europe, it is called the *Elk*. Its northern range in America is not ascertained. It has been found as far north as the country has been explored. It was formerly seen in the New England States; but is now rare, even as far south as the state of Maine.

The AMERICAN ELK. This animal was, for a long time, considered as a mere variety of the moose, if not identically the same; but more recent investigation has corrected the mistake, and shown, that though inferior in size to the moose, in beauty of form, grace, and agility of movement, and other attributes of its kind, it is not excelled by any deer of the Old and the New World. The hair of the elk in autumn, is of a blueish grey color; during winter, it continues of a dark grey, and at the approach of spring, it assumes a reddish or bright brown color, which is permanent throughout the summer. Its horns often rise to the height of four or five feet. The elk is shy and retiring. When surprised by the hunter, he gazes for a moment intensely upon the object of his fear, and then throwing back his lofty horns upon his neck, he flies with the velocity of the race horse. The flesh of the elk is highly esteemed by the Indians, and hunters, as food; and the hide is converted to the purpose of dress, &c. The elk is occasionally found in the remote and thinly settled parts of Pennsylvania; but it is only in the western wilds, where exists a luxuriant vegetation, and where the solitude is seldom interrupted, that they are seen in considerable numbers.

REIN DEER. The height of this animal is generally about three feet and a half, and his length about five feet and a half. His color is commonly brown, with white under the belly. His horns are long, slender, and branching.

This animal is of great value in the northern parts of both continents, and constitutes a very considerable part of the subsistence of the tribes inhabiting the region it frequents. In the northern parts of Asia and Europe, the rein deer has been domesticated for a long time; and with the exception of the dog is the only beast of draught or burthen possessed by the natives. The North American Indians, however, have never profited by the docility of the animal to aid them in transporting their families or property, though they annually destroy great numbers of them, for the sake of their flesh, hides, horns, &c.

To the Laplander they are of great importance, supplying the place of the horse, cow, sheep, and goat. The milk is used as food, and is often converted into cheese. Of the skins, a warm clothing is made for winter, and when dressed into leather, they are converted into stockings and shoes, and light summer clothing. Harnessed to a sledge, a rein deer will draw about 300 pounds; but the Laplanders generally limit the burthen to 240 pounds.

## REIN DEER DRAWING A SLEDGE.

The trot of the rein deer is about ten miles an hour; and his power of endurance is such, that journeys of 150 miles in nineteen hours are not uncommon. There is a portrait of a reindeer in the palace of Drottningholm, (Sweden,) which is represented upon an occasion of emergency, to have drawn an officer with important despatches, the incredible distance of eight hundred English miles, in forty-eight hours. This event is stated to have happened in 1699, and the tradition adds, that the deer dropped down lifeless upon his arrival.

The number of deer belonging to a herd is from three hundred to five hundred; with these, a Laplander can do well and live in tolerable comfort. He can make in summer a sufficient quantity of cheese for the year's consumption; and during the winter season can afford to kill deer enough to supply him and his family pretty constantly with venison. With two hundred deer, a man, if his family be but small, can manage to get on. If he has but one hundred, his subsistence is very precarious, and he cannot rely entirely upon them for support. Should he have but fifty, he is no longer independent, or able to keep a separate establishment; but generally joins his small herd with that of some richer Laplander, being then considered more in the light of a menial, undertaking the laborious office of attending upon and watching the herd, bringing them home to be milked, and other similar offices, in return for the subsistence afforded him.

The VIRGINIA or COMMON DEER. This deer is the smallest American species at present known, and is found in all parts of North America, and in the northern parts of South America. Considerable varieties in size and color are presented by this species, in the extensive range of country in which it is found. The length of the common deer is from five feet to five feet and a half.

This animal has always been of great importance to the Indians

scattered over the country, as well as to those who have settled our western wilds. Immense numbers are still found far to the west, as is evident from the vast number of hides and horns which are annually brought into the market.

ELEPHANT. "This wonderful quadruped," says Bigland, in his Natural History, "is a native of Asia and Africa, but is most numerous in the latter. In the extensive regions which lie between the river Senegal and the Cape of Good Hope, elephants abound more than in any other part of the world, and are also less fearful of man; for the savage inhabitants of those countries, instead of attempting to subdue this powerful animal, and render him subservient to their necessities, seem only desirous of avoiding his anger. In the countries near the Cape, elephants are seen in large herds, consisting of many hundred, and in the vast regions of Monomrotana, Monocmerci, and other parts of the interior of Africa, they are probably still more numerous.

"At the Cape, the height of the animal is from 12 to 15 feet. His eyes are very small in proportion to his size, but lively, brilliant, and full of expression. His ears are very large, long and pendulous; but he can raise them with great facility, and make use of them as a fan to cool himself, and drive away the flies or insects. His hearing is remarkably fine; he delights in the sound of musical instruments, to which he is easily brought to move in cadence. His sense of smelling is equally delicate; for he is highly delighted with the scent of odoriferous herbs. In each jaw he has four grinders; one of which sometimes measures nine inches in breadth, and weighs four pounds and a half.

"The proboscis, or trunk, is a most wonderful instrument. With it, the animal can lift from the ground the smallest piece of money, select herbs and flowers, untie knots, and grasp any thing so firmly that no force can tear it from him.

"Although the elephant be indisputably the strongest, as well as the largest of all quadrupeds; yet in its native woods it is neither formidable nor ferocious, but mild and peaceable in its disposition, equally fearless and inoffensive; and when tamed by man, and tutored by his instructions, the noble animal submits to the most painful drudgery, and is so attentive to the commands of his master, that a word or look is sufficient to stimulate him to extraordinary exertion.

"Of all the animals that have been subjugated by the human race, the elephant is universally allowed to be the most tractable and obedient. When treated with kindness, he testifies his gratitude by fulfilling all the desires of his keeper, caresses him with affectionate fondness, receives his commands with attention, and executes them with punctuality and zeal. He bends the knee for the accommodation of those who wish to mount upon his back, suffers himself to be harnessed, and seems to delight in the finery of his trappings. These animals are used in drawing chariots, wagons and various sorts of machines, having the strength of six horses; and they can travel near a hundred miles a day, and fifty or sixty regularly, without any violent effort."

## WARREN HASTINGS' ELEPHANT.

It sometimes happens, however, that domesticated elephants make their escape to the wild herd. Warren Hastings, the governor general of India, possessed an elephant, which had been ten years absent from the rule of man. His keeper being dismissed, he was refractory to all others who attempted to control him ; and at length escaped. After the long interval we have mentioned, his old keeper recognized him, and the elephant instantly submitted himself. The preceding is an exact portrait of this beautiful animal. The instrument which he carries with his trunk, is described as a cow-tail, with a silver handle, which elephants of rank bear for driving off flies.

"In taking the elephant, a large piece of ground is marked out, in the midst of some forest, and surrounded with strong palisades, interwoven with large branches of trees; one end of this enclosure is narrow, from which it opens gradually, so as to take in a considerable extent of country. Some thousands of people assemble, kindle large fires of which the elephants are exceedingly afraid, and by these and the noise of drums, they drive them towards the enclosure. Another large party with the aid of female elephants trained for the purpose, urge the wild ones slowly forward, the whole train closing in after them, shouting and making loud noises, till, by insensible degrees, they are driven into a narrow part, through which there is an opening into a smaller space, strongly fenced in and guarded on all sides. As soon as a wild elephant enters this narrow passage, a strong bar closes it from behind, and he finds himself completely environed. He is then urged forward to the end of the passage, where there is just room enough for him to go through. He is then received into the custody of two tame elephants, which stand one on each side; and if he be likely to prove refractory, they beat him with their trunks, till he is reduced to obedience and suffers himself to be led to a tree, where he is bound by the legs with stout thongs, of untanned elk skins. The tame elephants are then led back to the enclosure, and other wild ones are brought to submission in the same manner. Attendants are placed by the side of each elephant that is caught, and in the space of fourteen days, his subjugation is completed."

Elephants are sometimes taken, as in the kingdom of Ava, and other places, by means of *decoy female elephants.* These elephants are so trained as to favor the designs of their drivers. When a male wild elephant is discovered alone, the decoy elephants are let loose, upon which they proceed cautiously towards him, grazing along, as if they were, like him, inhabitants of the wild forest. As they approach him, he generally makes up to them, and abandons himself to their caresses. In the mean time, the hunters cautiously creep under him, and during the intoxication of his pleasure, fasten his fore legs with a strong rope; after which the hind legs are secured in the same manner; when the females quit him, he discovers his condition, and endeavors to make his escape. If the ropes are sufficiently strong, he soon becomes exhausted with his own rage.

ELEPHANT.

The following is a representation, of the manner of securing a male elephant as just described.

This extraordinary quadruped is thirty years in arriving at its full growth, and lives even in a state of captivity a hundred and twenty years; in a state of natural freedom, the duration of its life is supposed to be much further extended.

"In regard to the Elephant's discernment and sagacity, stories have been related that might seem incredible, and of which some are undoubtedly fictitious. Of such, however, as are so well authenticated as not to admit of a doubt, we have a sufficient number to shew its superiority over the rest of the brute creation. Some of the actions of this surprising animal might, indeed, almost seem to be the effects of a portion of intellect, rather than of mere instinct,

## ELEPHANT.

"Among the several anecdotes communicated by the Marquis de Montmirail, we find that the cornac or conductor of an elephant, had excited the animal to make an extraordinary effort, by showing him a vessel of arrack, which he pointed out as his reward; but when he had performed his arduous task, the elephant had the mortification of seeing himself disappointed of his expected recompense, and impatient of being thus mocked, immediately killed his governor.

The man's wife, who was a spectator of this dreadful catastrophe, in a fit of agonizing grief, took her two little infants and threw them at the feet of the enraged animal, saying, "Since you have destroyed my husband, kill me also and my children." The elephant immediately stopped; and, as if stung with remorse, took up the eldest boy with his trunk, placed him on his neck, and would never after obey any other governor. It is here to be observed, that the elephant is extremely fond of spirituous liquors, as well as of wine; and the sight of a vessel filled with these liquors, will induce him to make the most extraordinary exertions, and to perform the most painful tasks; and to disappoint him is dangerous, and his revenge is almost certain. But if he is vindictive, he is equally grateful, and will suffer no kindness shown him to go unrewarded.

"A soldier of Pondicherry, who frequently carried one of these animals a certain measure of arrack, being one day a little intoxicated, and seeing himself pursued by the guard, who were about to conduct him to prison, took refuge under the elephant, where he fell sound asleep. The guard attempted in vain to take him from this asylum, the elephant defending him with his trunk. The next day, the soldier becoming sober, was terrified at seeing himself placed under so enormous an animal; but the elephant caressed him with his trunk, to remove his fears, and made him understand that he might depart in safety.

"The elephant is sometimes seized with a sort of frenzy, which makes him extremely formidable, so that on the first symptoms of madness, he is commonly killed, in order to prevent mischief; yet in these fits, he has been frequently known to distinguish his benefactors; so strongly are gratitude and magnanimity impressed on his nature.

"The elephant that was kept in the menagerie, at Versailles, always, discerned when any person designed to make a fool of him, and always remembered an affront, which he never failed to revenge at the first opportunity. Having been cheated by a man who feigned to throw something into his mouth, he struck him with his trunk, and broke two of his ribs, and afterwards trampled him under his feet, and broke one of his legs. A painter being desirous of drawing him in the attitude of having his trunk erect and his mouth open, ordered his servants to make him retain that posture, by constantly throwing him fruit; the servant however at last deceived him, which so aroused his indignation, that perceiving the original cause of the deception to be the painter's desire of drawing him, he revenged himself by throwing with his trunk a large quantity of water on the paper, which completely spoiled the design."

The elephant is invariably employed in India, in hunting the tiger. Occasionally the hunter, with his rifle, is mounted on the elephant's

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back. When a tiger is perceived, he is fired at; if wounded he generally bounds towards the elephant with savage ferocity. In the mean time, the elephant, assisted by the hunters, prepares to keep him at bay; but if, at any time, the elephant's proboscis be injured, the contest ends from that moment. He seems to lose his self-command, his courage, and even his senses, and sets off at full speed, utterly regardless of his driver, and heedless of the way he takes. The following is a representation of an elephant thus wounded, fleeing from a tiger.

"The elephants exhibited in Europe, are commonly of a diminutive size, as the coldness of the climate both checks the growth and abridges

the life of these animals. That which has just been mentioned, and which was sent by the King of Portugal to Louis 14th, A. D. 1668, died in 1681, being four years old at his arrival, and being only thirteen years at the menagerie at Versailles. He was six feet and a half high, at four years old, and advanced in growth only one foot, during the thirteen years that he lived in France, although he was treated with care and fed with profusion. He had every day four pounds of bread, twelve pints of wine, two buckets of porridge, with four or five pounds of steeped bread; and two buckets of rice boiled in water.

"The elephant that died in 1803 at Exeter change, was brought over in the Rose East Indiaman, and purchased by the owner of the menagerie for £1000. He was generally fed with hay and straw, and could also eat with avidity, carrots, cabbages, bread, and boiled potatos. He was so excessively fond of beer, that he has been known to drink upwards of fifty quarts in a day given by his numerous visiters. He drank also nine pails of water daily, given at three different times; but the quantity he ate could not be precisely ascertained, as he frequently scattered great part of the straw which was given him for food, and ate a considerable portion of that which formed his litter. This animal would kneel down, bow to the company, or search the pocket of his keeper at command."

GIGANTIC MASTODON, or MAMMOTH. The former of these names is the appropriate appellation, according to Dr. Godman, of a creature of gigantic dimensions, which formerly existed in North America. The race itself is now extinct; but nearly entire skeletons have been found, and from their huge dimensions, it is apparent that they were among the chief of the works of God. To these animals, the name mammoth, said to be a corruption of the Hebrew word behemoth, was formerly applied. But the more appropriate name of mastodon, has at length, been given to it by Cuvier.

"The emotions experienced," says Dr. Godman, "when, for the first time, we behold the giant relics of this great animal, are those of unmingled awe. We cannot avoid reflecting on the time when this huge frame was clothed with its peculiar integuments, and moved by appropriate muscles; when the mighty heart dashed forth its torrents of blood through vessels of enormous calibre, and the mastodon strode along in supreme dominion over every other tenant of the wilderness. However we examine what is left to us, we cannot help feeling that this animal must have been endowed with a strength exceeding that of other quadrupeds, as much as it exceeded them in size, and, looking at its ponderous jaws, armed with teeth peculiarly formed for the most effectual crushing of the firmest substances, we are assured that its life could not be supported but by the destruction of vast quantities of food. Enormous as were these creatures during life, and endowed with faculties proportioned to the bulk of their frames, the whole race has been extinct for ages. No traditions nor human record of their existence have been saved, and but for the accidental preservation of a comparatively few bones, we should never have dreamed that a creature of such vast size and strength once existed,—nor could we have believed that such a race had been extinguished forever.

"Such, however," continues Dr. Godman, "is the fact—ages after

ages have rolled away—empires and nations have arisen, flourished, and sunk into irretrievable oblivion, while the bones of the mastodon, which perished long before the periods of their origin, have been discovered, scarcely changed in color, and exhibiting all the marks of perfection and durability. That a race of animals so large, and consisting of so many species, should become entirely and universally extinct, is a circumstance of high interest; for it is not with the mastodon as with the elephant, which still continues to be a living genus, although many of its species have become extinct;—the entire race of the mastodon has been utterly destroyed, leaving nothing but the 'mighty wreck' of their skeletons, to testify that they were once among the living occupants of this land."

The BEAR in general is an animal of great strength and ferocity of disposition, slow in his movements, and of sluggish habits. The eyes and ears are small, and the tongue smooth. The body and limbs are large and powerful, and covered with a thick woolly hair. Of this animal there are several species. We shall notice but three; the black, grisly, and polar bear.

Black Bear. This bear is found throughout North America, from the shores of the Arctic sea, to the most southern extremity. He is about three feet high, and from four and a half to five feet long. His feet are long, and crowned with five claws each. The food of this animal is principally grapes, plums, whortle berries, bramble, and other berries; he is also particularly fond of the acorns of the live oak, on which he grows excessively fat, in Florida, &c. In attempting to procure these acorns, bears subject themselves to great perils, for after climbing these enormous oak trees, they push themselves along the limbs towards the extreme branches, and with their fore-paws bend the twigs within reach, thus exposing themselves to severe, and even fatal accidents, in case of a fall. They are also very fond of the different kinds of nuts and esculent roots, and often ramble to great distances from their dens, in search of whortle berries, mulberries, and indeed all sweet flavored and spicy fruits; birds, small quadrupeds, insects and eggs, are devoured by them, whenever they can be obtained.

In the north, the flesh of the black bear is fitted for the table, after the middle of July, when the berries begin to ripen; though some kinds of berries on which they feed, impart a very disagreeable flavor to their flesh. They remain in good condition until the following January or February; late in the spring they are much emaciated, and their flesh is indifferent, in consequence of their long fasting through the season of their torpidity.

The black bear, like all the species of this genus, is very tenacious of life, and seldom falls unless shot through the brain or heart. An experienced hunter never advances on a bear that has fallen, without stopping to load his rifle, as the beast frequently recovers to a considerable degree, and would then be a most dangerous adversary. The skull appears actually to be almost impenetrable, and a rifle ball, fired at the distance of ninety-six yards, has been flattened against it, without appearing to do any material injury to the bone. The best place to direct blows against the bear is upon his snout; when struck elsewhere, his dense woolly coat, thick hide, and robust muscles, render manual violence almost entirely unavailing.

When the bear is merely wounded, it is very dangerous to attempt to kill him with such a weapon as a knife or tomahawk, or indeed any thing which may bring one within his reach. In this way, hunters and others have paid very dearly for their rashness, and barely escaped with their lives. The following instance may serve as an example of the danger of such an enterprize:

A farmer by the name of Mayborne, residing in the county of Cayuga, state of New York, having discovered the traces of a bear, took a pitchfork and hatchet, and proceeded, in company with his son, a boy 10 or 11 years of age, in quest of him. The bear at length was discovered, under a projecting cliff, below which was a deep ravine, at the bottom of which was a sort of basin or pond of water.

Mayborne, desiring his boy to remain where he was, took the pitchfork, and descending to the bottom, determined, from necessity, to attack him from below. The bear kept his position, until the man approached within six or seven feet, when on the instant, instead of being able to make a stab with the pitchfork, he found himself grappled by the bear, and both together rolled towards the pond, at least twenty, or twenty-five feet, the bear biting his left arm, and hugging him almost to suffocation. By great exertion the man thrust his right arm partly down his throat, and in that manner endeavored to strangle him, but was once more hurled headlong down through the bushes, a greater distance than before, into the water. Here, finding the bear gaining on him, he made one desperate effort, and drew the animal's head partly under water, and repeating his exertions, at last weakened him so much, that, calling to his boy, who stood on the other side in a state little short of distraction for the fate of his father, to bring him the hatchet; he sunk the edge of it, by repeated blows, into the brain of the bear. This man, although robust and muscular, was scarcely able to crawl home, where he lay for nearly three weeks, the flesh of his arm being much crushed, and his breast severely mangled. The bear weighed upwards of four hundred pounds.

Grisly Bear. This bear is in length about seven feet, and in height four and a half. His hair is long, and generally almost black. He is unable to climb trees, like other bears, and is more intimidated by the voice than the aspect of man. His ferocity, under the excitement of hunger is terrible. His name is dreadful to the Indians, and the killing of one is esteemed equal to a great victory.

This bear at present inhabits the country adjacent to the eastern side of the Rocky Mountains, where it frequents the plains, or resides in the copses of wood, which skirt along the margin of water courses.

The grisly bear is remarkably tenacious of life, and on many occasions, numerous rifle balls have been fired into the body of an individual, without much apparent injury. Instances are related by the travellers, who have explored the countries in the vicinity of the Rocky Mountains, of from ten to fifteen balls having been discharged into the body of one of these bears before it expired.

The following statement is from Major Long's Expedition to the Rocky Mountains:

" One evening, the men in the hindmost of one of Lewis' and Clark's canoes perceived one of these bears, lying in the open ground, about three hundred paces from the river, and six of them, who were all good

hunters went to attack him. Concealing themselves by a small eminence, they were able to approach within forty paces unperceived; four of the hunters now fired, and each lodged a ball in his body, two of which passed directly through his lungs. The bear sprung up, and ran furiously with open mouth upon them; two of the hunters, who had reserved their fire, gave him two additional wounds, and one breaking his shoulder blade, somewhat retarded his motions. Before they could again load their guns, he came so close to them, that they were obliged to run towards the river, and before they had gained it, the bear had almost overtaken them. Two men jumped into the canoe; the other four separated, and concealing themselves among the willows, fired as fast as they could load their pieces. Several times the bear was struck, but each shot seemed only to increase his fury towards the hunters. At last he pursued them so closely, that they threw aside their guns and pouches, and jumped from a perpendicular bank into the river. The bear sprung after them, and was very near the hindmost man, when one of the hunters on the shore shot him through the head, and finally killed him. When they dragged him on shore, they found that eight balls had passed through his body in different directions."

Polar Bear. This animal is stated to be generally four or five feet high, from seven to eight feet long, and nearly the same in circumference. Individuals have frequently been met with of much greater size: Barentz killed one in Cherie Island, whose skin measured thirteen feet. The weight is generally from six to eight hundred pounds. The hair of the body is long, and of a yellowish white color, and is very shaggy about the inside of the legs. The paws are seven inches or more in breadth, with claws two inches long.

A considerable part of the Polar bear's food is supplied by seals, but very probably he suffers long fasts and extreme hunger, owing to the peculiar vigilance of these creatures; occasionally, he is much reduced by being carried out to sea on a small island of ice, where he may be forced to remain for a week, without an opportunity of procuring food. In this situation, they have been seen on ice islands, two hundred miles distant from land, and sometimes they are drifted to the shores of Iceland, or Norway, where they are so ravenous as to destroy all the animals they find.

SEAL. The seal has a round head, and in the fore part bears considerable resemblance to the otter, though the whole aspect is not unlike that of some varieties of the dog, whence the names of sea-dog and sea-wolf have been applied to different species of the seal. The general color of the seal is of a yellowish gray, varied or spotted with brown or black in different degrees, according to the age of the animal.

The common seal frequents the sea coasts, perhaps throughout the world; but it is most numerous in high northern latitudes, and furnishes the inhabitants of those frigid regions with nearly all their necessaries and luxuries. The food of the common seal is fish, crabs, and birds, which last it contrives to secure by rising under them, and seizing their feet before they are aware of its approach. Feeding on much the same food as some whales, the latter are not found where seals are very numerous. In the spring of the year, the seals are fattest, and yield several gallons of blubber; small ones afford four or five gallons of oil.

The best situation for sealing in the Arctic Seas is stated by Scoresby, to be in the vicinity of Jan Mayen's Island, and the best seasons, the months of March and April.

The number of seals destroyed in a single season by the regular sealers, may well excite surprise; one ship has been known to obtain a cargo of four or five thousand skins, and upwards of a hundred tons of oil. Whale ships have accidentally fallen in with and secured two or three thousand of these animals during the month of April. The sealing business is, however, very hazardous, when conducted on the borders of the Spitzbergen ice. Many ships, with all their crews, are lost by the sudden and tremendous storms occurring in those seas, where the dangers are vastly multiplied by the driving of immense bodies of ice. In one storm that occurred, in the year 1774, no less than five seal ships were destroyed in a few hours, and six hundred valuable seamen perished.

The seal is generally very fat, and his supply of food is abundant, and the amount of blood contained in his body is far greater than would be inferred from comparing him with other animals. The flesh is of a very dark red color, and rather soft; that of the young animal is thought to be quite good by Europeans, but the Esquimaux are extremely fond of it at every age, and under all circumstances.

BEAVER. This animal is represented by Dr. Godman as about two feet in length, having a thick and heavy body, especially at its hinder part. The head is compressed, and somewhat arched at the front, the upper part being rather narrow, and the snout at the extremity quite so; the neck is very short and thick. The eyes are situated rather high up on the head, and have rounded pupils; the ears are short, elliptical, and almost entirely concealed by the fur. The whole skin is covered by two sorts of hair; one which is long, rather stiff, elastic, and of a grey color for two thirds of its length next the base, and terminating by shining, reddish brown points, giving the general color to the pelage; the other is short, very fine, thick, tufted and soft, being of different shades of silver grey, or light lead color. On the head and feet, the hair is shorter than elsewhere. The tail, which is ten or eleven inches long, is covered with hair, similar to that of the back.

The general aspect of the beaver, at first view, would remind one of a very large rat, and seen at a little distance, it might be readily mistaken for the common musk rat. But the greater size of the beaver, and thickness and breadth of its head, and its horizontally flattened, broad and scaly tail, render it impossible to mistake it for any other creature, when closely examined.

Beavers are not particular in the site they select for the establishment of their dwellings; but if in a lake or pond where a dam is not required, they are careful to build where the water is sufficiently deep. In standing waters, however, they have not the advantage afforded by a current for the transportation of their supplies of wood, which, when they build on a running stream, is always cut higher up than the place of their residence, and floated down.

The materials used for the construction of their dams, are the trunks and branches of small birch, mulberry, willow, poplar, &c. They be-

gin to cut down their timber for building, early in the summer, but their edifices are not commenced until about the middle or latter part of August, and are not completed until the beginning of the cold season. The strength of their teeth, and their perseverance in this work, may be fairly estimated by the size of the trees they cut down. Dr. Best informs us that he has seen a mulberry tree eight inches in diameter, which had been gnawed down by the beaver.

The figure of the dam varies according to circumstances. Should the current be very gentle, the dam is carried nearly straight across; but when the stream is swiftly flowing, it is uniformly made with a considerable curve, having the convex opposed to the current.

The dwellings of the beaver are formed of the same materials as their dams, and are very rude, though strong, and adapted in size to the number of their inhabitants. These are seldom more than four old, and six or eight young ones. Double that number have been found occasionally in one of the lodges, though this is by no means common.

When building their houses, they place most of their wood crosswise, and nearly horizontally, observing no other order than that of leaving a cavity in the middle. Branches which project inward, are cut off with their teeth, and thrown among the rest. The houses are by no means built of sticks first, and then plastered; but all the materials, sticks, mud, and stones, if the latter can be procured, are mixed up together, and this composition is employed from the foundation to the summit. The mud is obtained from the adjacent banks or bottom of the stream or pond, near the door of the hut. Mud and stones the beaver always carries, by holding them between his fore paws and throat.

Their work is all performed at night, and with much expedition. When straw or grass is mingled with the mud used by them in building, it is an accidental circumstance, owing to the nature of the spot whence the latter is taken. As soon as any part of the material is placed where it is intended to remain, they turn around, and give it a smart blow with their tail. The same sort of blow is struck by them upon the surface of the water, when they are in the act of diving.

The outside of the hut is covered or plastered with mud late in the autumn, and after frost has begun to appear. By freezing, it soon becomes almost as hard as stone, effectually excluding their great enemy, the wolverene, during the winter. The habit of walking over the work frequently during its progress, has led to the absurd idea of their using their tail as a trowel.

The beaver feeds principally upon the bark of the aspen, willow, birch, poplar, and occasionally the alder, but it rarely resorts to the pine tribe, unless from severe necessity. They provide a stock of wood from the trees mentioned, during the summer season, and place it in the water opposite the entrance to their houses.

The beaver is a cleanly animal, and always leaves the house to attend to the calls of nature; the excrement being light, rises to the top of the water, and soon separates and disappears. Thus, however, great may be the number of inhabitants occupying the hut, no accumulation of filth of this kind occurs.

The number of beavers killed in the northern parts of this country, is exceedingly great, even at the present time, after the fur trade has been carried on for so many years, and the most indiscriminate warfare waged uninterruptedly against the species. In the year 1820, sixty thousand beaver skins were sold by the Hudson's Bay Company, which we can by no means suppose to be the whole number killed, during the preceding season. If to these be added the quantities collected by the traders from the Indians of the Missouri country, we may form some idea of the immense number of these animals which exist throughout the vast regions of the north and west.

## SECTION VI.

### FISH.

It is not our design, nor will it accord with our limits, to enter into the natural history of fish in general; but rather to notice, in brief terms, a few of the more common sorts; those which are important either as aliments, or otherwise contributing to the comfort of man. We begin with the

SALMON FISHERY. Salmon are a very general and favorite article of food. When eaten fresh, they are tender, flaky, and nutritive; but are thought to be difficult of digestion. The flesh of the salmon is of a red color, and the beauty of its appearance is increased by soaking the slices of it in fresh water, before they are cooked. It has two fins on the back, which distinguish it from other fish. It will live both in salt and fresh water, and is often found at the distance of 200 miles up rivers, in the season of spawning; and will, with this object in view, leap milldams and falls, many feet high. The modes of curing salmon are various; but are chiefly by drying, smoking, salting, and pickling. The chief places in Europe, where the salmon fishery is carried on, are in England, Scotland, and Ireland, in the rivers and sea coasts near the rivers' mouths. The fishing season usually begins about the first of January, and ends by the last of September. It is commonly performed with nets. Salmon were formerly abundant in the rivers of New England, especially in the Connecticut river. At the period of their greatest abundance, they were sold for two coppers apiece. At present they are taken chiefly in the rivers, and on the coast of Maine.

COD FISHERY. The cod is a fish of passage, and is usually from eighteen inches to three or four feet in length; with a large head, and teeth in the bottom of the throat. Its flesh is white, its skin brownish on the back, and covered with a few transparent scales. It eats excellently when fresh; and if well prepared and salted, will keep a long time. The grand resort, for centuries past, of this fish, has been on the banks of Newfoundland, and near Cape Breton. The vessels used are from a hundred to a hundred and fifty tons burden, and they catch thirty or forty thousand fish apiece. The most essential article in this fishery is, to have a master who knows how to open this fish, to cut off the

heads, and salt them; upon his ability in this, the success of the voyage depends. The commerce in this kind of fish is the most secure and advantageous that is known. The best fishing season is from the beginning of February to the end of April, at which time, the cods, which during the winter had retired to the deepest part of the sea, return to the bank and grow very fat. Those caught from March to June, keep well enough; but those in July, August and September, soon spoil. The fishing is sometimes done in a month or six weeks; sometimes it holds six months.

Each fisher only takes a cod at a time; and yet, an experienced man will take three or four hundred in a day. They salt the cod on board. This description respects the *green cod-fishery*. In the fishing of *dry cod*, vessels of all sizes are employed. As cod is only to be dried in the sun, European vessels are obliged to put out in March or April, to have the benefit of the summer for drying. The principal fishery for dry cod, is along the coast of Placentia, a sea-port of Newfoundland. The fish intended for this use, though of the same kind as the green cod, are much smaller, and hence fitter to keep. The method of fishing is much the same in both; only this latter is more expensive, as it takes up more time, and employs more hands; and yet scarce half the salt is used in this as in the other. When the fish have taken salt, they are laid in piles on the galleries of the scaffold; when drained, they are ranged on hurdles, and frequently turned to dry the better. There are four kinds of commodities drawn from cod; viz. the tripes, or sounds and tongues, salted at the same time with the fish; the roes, or eggs, which being salted and barrelled up, serve to cast into the sea to draw the fish together; and lastly, the oil, which is used in the dressing of leather.

HERRING FISHERY. The herring is a small fish, from eight to ten inches in length, which feeds, in countless multitudes, in the inaccessible seas of the north; whence they proceed along the coast of Holland, reach the Shetland islands in the month of June, where, separating, they surround the British Isles. In September they unite again, at Land's End, whence they proceed to the American shore, and along the coast of Newfoundland, and at length, return to their polar habitations.

The herring fishery, in different parts of the world, affords occupation and support to a great number of people. In Holland, it has been calculated, that formerly more than 150,000 persons were employed in catching, pickling, drying, and trading, in herrings; and on the different coasts of Great Britain, many thousands of families are entirely supported by this fishery. The principal of the British herring fisheries are off the coasts of Scotland and Norfolk; and the implements that are used in catching the fish, are nets stretched in the water, one side of which is kept from sinking, by buoys fixed to them at proper distances, and the other hangs down, by the weight of lead which is placed along its bottom. The herrings are caught in the meshes of the nets, as they endeavor to pass through; and unable to liberate themselves, they continue there, until the nets are hauled in and they are taken out.

Some of them are *pickled*, and others *dried*. In the preparation of the latter, (which have the name of *red herrings*,) the fish are soaked for twenty-four hours in brine, and then taken out, strung by the hand

on little wooden spits, and hung in a chimney formed to receive them. After this, a fire of brush-wood, which yields much smoke, but no flame, is kindled beneath, and they are suffered to remain till they are sufficiently dried, when they are packed in barrels for exportation and sale.

MACKEREL FISHERY. The mackerel is a salt water fish, usually from a foot to eighteen inches in length; its weight seldom exceeds two or three pounds. It is found on the French, English, and American coasts, and also in large shoals in the ocean. They are excellent food, when fresh, but much greater quantities are used in a pickled state. This fishery employs a great number of men, and a large capital, both here and in Great Britain. The method of taking the fish is either with a line or net. If with a line, the bait used is a piece of red cloth or the tail of a mackerel. The method of taking the fish with nets is more common, and is usually performed in the night time. The water wherein mackerel have been boiled often yields a light after being stirred a little.

SHAD. This important and delicious fish is found, it is believed, in no other country besides America. In many of the rivers of the United States, it abounds. During the months of April, May, and a part of June, multitudes are caught, which are eaten fresh or salted. Those caught in the rivers of New England are the most esteemed. The Connecticut river shad are justly famous. This fishery employs several thousand men, who pack thousands of barrels, which find their way into every part of the interior.

The LOBSTER is found extensively diffused in the various salt waters of the globe. The common method of taking them is in *pots*, or a kind of trap, constructed of twigs, baited with garbage, and formed similar to a wire mouse trap, so that the animal, after entering it, cannot escape. Such machines are fastened to a cord sunk in the sea, and the place is marked by a buoy. In summer they are found near the shore, and thence to about six fathoms deep; but in winter, they are seldom taken in less than twelve or fifteen fathoms of water.

Lobsters continue to grow in size, only while their shells are soft. Those selected for the table, ought to be heavy in proportion to their size, and furnished with a hard crust on their sides, which, when in perfection, will not yield to a moderate pressure.

The meat of the lobster is not easy of digestion. Sometimes the immoderate use of lobsters is attended with eruptions of the erysipelatous kind in the face, or a species of nettle-rash over the whole body; either of which, being salutary efforts of nature to expel noxious matter, are more troublesome than dangerous.

OYSTERS. Of this shell fish, it is said, that there are an hundred and fifty species. They are to be found in all countries on the globe. In the East Indies, they are sometimes two feet in diameter. The oysters found on the English coast are said to have a strong copper taste, which they acquire from growing on the copper banks. This taste renders them unpleasant at first, but at length it imparts to them a highe relish.

During the breeding season, and for some weeks following, oysters are said to be quite unhealthy; but in all other seasons of the year they are esteemed an excellent food, and are eaten both raw and dress-

ed in various ways; in a fresh state, however, they are doubtless preferable; for, by cooking, they are, in a great measure, deprived of their nourishing jelly, and of the salt water which promotes their digestion in the stomach. Hence raw oysters may be used with equal advantage, by the robust, the weak, and the consumptive. Independent of the nutritive effects peculiar to this shell fish, it generally tends to open the bowels, especially if a certain quantity be swallowed at one meal; hence to persons of a costive habit, they afford a *dietetic supper.*

TORTOISE. This amphibious animal is found in the West Indies, and the South Seas. Between thirty and forty different species have been enumerated. Some of the species, such as the common *green turtle*, and the *hawks-bill turtle*, grow to a very large size, and are not unfrequently four, five, or six hundred pounds in weight. Those who take them, watch them when they go from their nests on shore, in moon-light nights; and before they reach the sea, turn them on their backs, and leave them till morning, for they are utterly unable to recover their former position; at other times, they hunt them in boats, with a spear, striking them with it through the shell; and as there is a cord fastened to the spear, they are taken much in the same manner as whales. Tortoises will live after being deprived of the brain, and even of their heads. The flesh of many of the sea turtles is highly esteemed as food; that of the hawks-bill, however, is indifferent; this species is noticed, chiefly as producing the tortoise shell of commerce, so well known and used for various purposes.

WHALE. The whale, of which there are several species, is the largest of all animals; it is sometimes ninety feet long, and those of the torrid zone are said to be much larger. The head is about one third the length of the whole fish; the under lip is much broader than the upper. The tongue is a spongy, fat substance, sometimes yielding five or six barrels of oil. The gullet, or swallow of the whale, in some species, is very small for so large an animal; it does not exceed four inches in width; but it is proportioned to the food it eats, which is said to be a particular kind of small snail; or, as some say, it varies its repast with the medusa, or sea-blubber, an animal which is found in the sea. The whale has two orifices in the middle of the head, through which it spouts water to a great height, and sometimes with a noise like thunder. Its eyes are not larger than those of an ox, and placed at a great distance from each other. Under the skin the whale is covered with fat or blubber, from six to twelve inches thick, which sometimes yields from one to two hundred barrels of oil. The flesh is red and coarse, somewhat like beef. The Greenlanders eat it, and the Icelanders soak it in sour whey. Whales, which produce the well known article of *whale bone*, are chiefly caught in the north seas; the largest sort about Greenland or Spitzbergen. At the first discovery of that country, and at the beginning of this fishery, they took nothing but the pure oil and the whalebone, and all the business was executed in the country; by which means, a ship could bring home the product of more whales than she can at present, as it is now conducted.

A whale, extended motionless, at the surface of the sea, can sink in the space of five or six seconds, beyond the reach of its human enemies. The usual rate at which whales swim, seldom exceeds four

miles an hour; when urged by the sight of an enemy, or alarmed by the stroke of a harpoon, they swim at the rate of eight or nine miles an hour. But this speed never continues longer than for a few minutes. They commonly remain at the surface to breathe, two minutes; during which time, they blow eight or nine times, and then descend for an interval, usually of five or ten minutes. When struck, their descent extends, sometimes, to the depth of 700 or 800 fathoms.

The maternal affection of the whale is striking and interesting. When her cub is harpooned, she will join it at the surface of the water, and encourage it in its attempt to escape; and for this purpose, will take it under her fin, and seldom deserts it while life remains. At such times, she loses all regard for her own safety, and it is exceedingly dangerous to approach her.

Every whale ship is furnished with six boats. Those called six-oared boats, adapted for carrying seven men, six of whom, including the harpooner, are rowers, are generally from 26 to 28 feet in length, and about five feet nine inches in breadth. Six-men boats, and four-oared boats, are proportionably smaller.

The instruments in general use, in the capture of the whale, are the harpoon and lance. The harpoon is an instrument of iron, about three feet in length. It consists of three conjoined parts, called the socket, shank, and mouth; the latter of which, includes the barbs or withers. The next in importance to the harpoon, is the lance. It consists of a hollow socket, six inches long, and swelling from half an inch, the size of the shank, to near two inches in diameter; into which is fitted a four feet stock, or handle, of fir: a shank five feet long, and half an inch in diameter; and a mouth of steel, which is made very thin, and exceedingly sharp, seven or eight inches in length and two and a half inches in breadth.

On the arrival of a ship at the fishing station, the master, or officer of the watch, takes his station in the crow's nest, a place fitted for sheltering him from the wind, on the main top-mast, or top-gallant mast head, from which he keeps an anxious watch, for the appearance of a whale. The moment that a fish is seen, he gives notice to the watch upon deck, part of whom leap into a boat, are lowered down, and push off towards the place. On coming near, the harpoon is thrown. The wounded whale, in the surprise and agony of the moment, makes a convulsive effort to escape. Then is the moment of danger. The boat is subjected to the most violent blows from its head, or its fins; but particularly from its ponderous tail, which sometimes sweeps the air with such tremendous fury, that both boat and men are exposed to one common destruction.

A signal is now given to the people on board of the vessel, by setting up one of their oars in the middle of the boat. On perceiving this, the men on the watch alarm all the rest by the cry of "fall, fall," and the other boats go immediately to the assistance of the first. The whale, finding himself wounded, runs off with prodigious violence, sometimes horizontally, and at others descending perpendicularly. The rope which is fastened to the harpoon is about two hundred fathoms long; but sometimes several ropes are united together. The velocity with which the whale draws it over the sides of the boat is so great,

that it is wetted to prevent its taking fire. The fishermen find it necessary to let go the rope for a time, till the whale is spent, otherwise its violence would sink the boat. The whale soon, however, comes up, for it cannot long stay below water, and being now fatigued and wounded, stays above longer than usual. It is now struck again with a harpoon, and again descends, but with less force; when it comes up again, it is generally incapable of descending, but suffers itself to be wounded and killed with long lances, with which the men are provided. It is known to be near death when it spouts up the water deeply tinged with blood. The whale being dispatched, the body floats; the fins and tail are now cut off, and it is drawn to the vessel; the blubber or fat cut off, and the whalebone cut off from the upper jaw; the fat and the bone being all which is wanted; the remains of the whale are left. When the ship is thus sufficiently laden, it sails homewards, during which voyage the fat is melted down into oil. One of the largest fish will fill more than seventy butts. The produce of a large whale is valued at about a thousand pounds.

A considerable whale fishery is also carried on in the South Seas; here the object of the fishermen is the *spermaceti whale*, which produces not only a much more valuable oil than the preceding, but also the peculiar substance called *spermaceti*.

## SECTION VII.

### FOWL.

No part of nature exhibits a more beautiful variety, than the feathered tribes. Did our limits permit, it would be pleasant to ourselves, and not without interest, we trust, to our readers, to describe, at some length, these tenants of the air; but as utility, rather than amusement, is the object of our work, we must content ourselves with noticing chiefly that part of the feathered creation, which contributes to the comfort of man, with a notice of a limited number belonging to other classes.

Birds of the more useful description are of the *poultry* kind, in which class are ranked all those which have white flesh, and bodies bulky, when compared with the size of their head and limbs. These are the common cock, the peacock, the turkey, the Guinea hen, the pheasant and the partridge.

The COCK is allowed originally to have been a native of Persia, imported into Europe many centuries ago. Few animals of the flying species exhibit so many varieties as the cock; there being scarcely two birds of this description that resemble each other in plumage and shape. Some species are without the tail, and others destitute of a rump. Instead of feathers, which usually belong to this fowl, a species is found in Japan, which is covered with hair. In the island Tinian, and several others in the Indian Ocean, the plumage of the cock is black

and yellow, and his comb and wattles are of the latter color and purple combined.

No animal in the world has greater courage than the common domestic cock, when opposed to one of his own species; and in every part of the world, where refined and polished manners have not entirely taken place, cock fighting is a principal diversion. In several parts of Europe, this vulgar amusement is still common, and not unfrequent in some of the southern states of our own country. The following story is authentically related of a gentleman some years since in England, who was passionately fond of this sort of gaming. He possessed a favorite cock, on which he had won several profitable matches. The last bet he laid on the cock, he lost; which so enraged him, that he had the bird tied to a spit, and roasted alive, before a large fire. The screams of the miserable animal were so affecting, that some gentlemen, who were present, attempted to interfere, which so increased the gentleman's anger, that he seized a poker, and with the most furious vehemence declared that he would kill the first man who should interpose; but in the midst of his passionate asseverations, he fell down dead upon the spot—a solemn warning to all, who violate the common and obvious principles of humanity.

The HEN. If well fed and allowed to roam in a farm yard, a good hen will deposit, in the course of twelve months, above 200 eggs; but if left entirely to herself, she seldom lays more than fifteen eggs in the same nest without attempting to hatch them; but, if eggs only be desired, they should be removed, only one being left, and she will continue to lay for a long time. When the hen begins to sit, nothing can exceed her perseverance and patience; she continues for some days immoveable, and when forced away by the importunities of hunger, she quickly returns. While the hen sits, she carefully turns her eggs, till at length, in about three weeks, the young brood begin to give signs of a desire to burst their confinement. When all are produced, she then leads them forth to provide for themselves. Her affection and pride seem then to alter her very nature, and correct her imperfections. No longer voracious and cowardly, she abstains from all food that her young can swallow, and flies boldly at every creature that she thinks is likely to do them mischief.

The proper heat for hatching a hen's egg, according to some, is 104° of Fahrenheit; according to others, 96°; to which degree the surface of the body of the hen will raise the thermometer, when she sits upon her eggs. In those birds who do not sit constantly, but trust chiefly to the heat of the sun, as the crane, heron, ostrich, &c. &c., the temperature of the eggs is probably below 104°.

The full period of the hen in this country, is known to be 21 days. In warmer climates, it is said to be a day or two less. The following table was compiled by Count Morozzo, in a letter from him to Lacepede: it shows the periods of incubation, compared with those of the life of certain birds.

POULTRY.

| *Name of the Bird.* | *Period of Incuba.* | *Duration of Life.* |
|---|---|---|
| Swan - - | 41 days | about 200 years. |
| Parrot - - | 40 | 100 years. |
| Goose - - | 30 | 80 or more. |
| Eagle - - | 30 | not known. |
| Bustard - - | 30 | not known. |
| Duck - - | 30 | not known. |
| Turkey - - | 30 | not known. |
| Peacock - - | 26 to 27 | 25 to 28 |
| Pheasant - - | 20 to 25 | 18 to 20 |
| Crow - - | 20 | 100 or more. |
| Nightingale - | 19 to 20 | 17 to 18 |
| Hen - - | 19 to 21 | 12 to 15 |
| Pigeon - - | 17 to 18 | 16 to 17 |
| Canary - - | 13 to 14 | 13 to 14 |
| Goldfinch - - | 13 to 14 | 18 to 20 |

Artificial means have been adopted, in different parts of the world, to hatch chickens from the eggs, without the assistance of the hen. In Egypt, the method adopted is to place the eggs in stoves, erected for their reception, and to supply them with such a degree of heat, as is necessary to call them into life. By this means, it is said, that tens of thousands of chickens are annually hatched in the above country.

Reaumur, the celebrated naturalist, instituted a series of experiments, to reduce the art of hatching chickens, to fixed principles. According to him, the degree of heat necessary to accomplish the object, is 96° of Fahrenheit. He also invented a kind of hollow covers, or low boxes without bottoms, and lined with fur, which he called *artificial parents.* These were designed to shelter the chickens when hatched, and to afford them protection similar to the wings of the hen.

Hens which do not lay in the winter should have access to slacked lime, pounded bones, oyster shells, or other matter, which contains lime, or some of its compounds, because something of the kind is necessary to form the shell of their eggs. This is not necessary for those hens which are fed on wheat, as that grain contains phosphate of lime, the substance of which egg shells are composed.

It is obviously an important point to ascertain the most economical method of keeping and fattening poultry. Boiled potatos, as food for poultry, is both excellent and economical. Some writers recommend a proportion of beets, ripe and sweet pumpkins, and squashes, to be mixed with the potatos; others recommend a small portion of bran, or Indian meal.

To fatten chickens expeditiously, the Domestic Encyclopedia recommends to take a quantity of ground rice, and an equal quantity of common flour: mix sufficient for present use with milk, and a little coarse sugar, stir the whole well over a fire, till it makes a thick paste; and feed the chickens in the day time only, by putting as much of it as they can eat, but no more, into the troughs belonging to the coops. It must be eaten while warm; and if they have also beer to drink, they will soon grow very fat. A mixture of oatmeal and treacle, combined till it crumbles, is said to form a food for chickens, of

which they are so fond, and with which they thrive so rapidly, that at the end of two months, they become as large as the generality of full grown fowls, fed in the common way. But no common fowl is to be compared with a capon thus fed.

A writer in the New England Farmer recommends to confine fowls in a large airy inclosure, and feed them on broken Indian corn, Indian meal, or mush with raw potatos, cut into small pieces not larger than a filbert; placing within their reach a quantity of charcoal, broken into small pieces, which he says they will greedily eat, and thereby promote a rapid digestion of their food. By this method, they will fatten in one half the usual time, with much less expense.

The French, who are great egg eaters, take unusual pains to obtain fresh laid eggs in winter. For this purpose, they keep their hens in a dry warm place, it being well known that exposure to wet weather, especially cold wet weather, diminishes their propensity to lay. Stimulating food is given them, such as barley, wheat, bolted and given warm, and also curds, buck wheat, parsley, and other herbs, chopped fine, oats and wheat, and occasionally hemp seed, and the seed of nettles. White cabbages, chopped up, are excellent in winter, for all sorts of poultry.

The *ailments* of fowls are numerous; but they would seldom be seen, if the proper care were taken. If well fed, and kept perfectly clean, fowls will seldom be sick; and in respect to age, they should never be kept more than two or three years, since beyond this period they are of little value as layers.

With ordinary management, however, fowls will sometimes be troubled with diseases, among the most fatal of which is a disorder called *gapes;* a disease which, in New England, we believe, generally goes by the name of *pip.*

In chickens, the gapes is said to arise from a worm, and some say a collection of worms in the wind-pipe; according to others, it is a thick viscous matter, which lines the wind-pipe. Mr. Mobray informs us that the pip is a white scale, growing on the tip of the tongue, which must be torn off, and the part rubbed with salt. Whatever be the nature of the disease, it usually destroys a large proportion of all the chickens that are hatched. Various prescriptions have been suggested for its cure. Some advise to mix soft soap with meal dough; others to make a decoction of red pepper, with which to wet up mush, to be given to the chickens. Others recommend, in respect to full grown fowls, which are afflicted with this disease, to pull the feathers from the tail.

The TURKEY, it is thought, belonged originally to North America: but is now common throughout Europe. It was formerly found wild, in the forests of Canada and the United States; and flocks are, to this day, occasionally seen. The wild turkey is generally larger than the domesticated.

Young turkies are liable to the pip, which often proves speedily fatal. The remedies suggested in respect to chickens which have this disease, may, perhaps, be found equally beneficial in respect to turkies. A writer remarks, however, that on inspecting the rump feathers, two or three of their quills will be found to contain blood; but on drawing

them out, the chick soon recovers, and afterwards requires no other care than common poultry.

The GUINEA HEN, is a bird well known in England, but is a native of Africa and America. The flesh is thought by many to be delicious; it requires great care in being reared in this climate; a good common hen will hatch the eggs much better than the Guinea hen herself, and to common hens in this country, should the eggs of the Guinea hen always be entrusted. The Guinea hen does not conform to climate, like many other birds; its lays its eggs on the bare ground, and after the young are hatched, it often neglects them. The bird will lay many eggs; but they are extremely small for the size of the bird; much less than a pullet's egg.

The GOOSE. This common bird is probably the wild goose domesticated. The latter, it is well known, is a bird of passage, and on the approach of spring, large flocks of them are seen wending their way towards the polar regions. The fortunate sportsman sometimes brings down one from his airy height. If only wounded, he may be tamed, ard will readily pair with the common grey goose.

The goose is a valuable but expensive bird;—valuable, as it furnishes feathers for our beds; and, in this view, may be regarded as necessary, —expensive, requiring considerable food during the winter season, but more expensive, from the injury that it occasions to our meadows and pasture lands.

The method of rearing geese is so well known, and so uniform, that it will be unnecessary to describe it. It may be proper, however, to notice a recommendation found in Willich's Encyclopedia: viz. to break the shell near the beak of the young goslin, about the period of its hatching. This we should deem injudicious and unnecessary. Wild geese can have no assistance of this kind, and we conclude that goslins can, generally speaking, make their way into the world, without the proposed manipulation.

As geese form a principal delicacy at our tables, the most expeditious mode of fattening them is an object of some importance. Hence, it has been recommended to keep them cooped up in a dark and narrow place, where they are to be fed with ground malt, mixed with milk, or, if milk be scarce, with barley meal, mashed up with water. Cobbett recommends feeding them with corn, some raw Swedish turnips, carrots, white cabbage or lettuce.

The *Complete Farmer*, an English work, says: "if you would fatten geese, you must shut them up when they are about a month old, and they will be fat in about a month more. Be sure to let them have always, in a small rack some fine hay, which will much hasten their fatting. But for fatting older geese, it is commonly done when they are about six months old, or soon after harvest, when they have been in stubble fields, from which food they will grow tolerably fat. But those who are desirous of having them very fat, shut them up for a fortnight or three weeks, and feed them with oats, split peas, barley meal, or ground malt, mixed with milk. But the best thing to fatten them with, is malt, mixed with beer. You must, however, observe in fattening all sorts of water-fowl, that they usually set with their bills upon their

rumps, where they suck out the greater part of the moisture and fatness at a small bunch of feathers, which you will find standing upright on their rumps, and always moist, with which they trim their feathers, which renders them more oily and slippery than the feathers of other fowls, and causes the water to slip off them. If, therefore, the upright feathers are cut away close, they will become fat in less time, and with less food than otherwise. If you give them rye, before or about midsummer, it will strengthen them and keep them in health, that being commonly their sickly time.

In choosing geese for table, care should be taken that the feet and legs be yellow, which is an indication of the bird being young; the legs of old geese are red. If recently killed, the legs will be pliable, but if stale, they will generally be found dry and stiff.

A new breed of geese, called Bremen geese, has been introduced into the United States, which is said to be decidedly superior to any heretofore known in this country. They were first imported, we believe, by Mr. James Sisson, of Warren, (R. I.) who received a premium in October, 1826, from the Rhode Island Society for the Encouragement of Domestic Industry, for the exhibition of some geese of this breed. They are said to possess the following advantages over any other animals of their kind: they grow to a greater size, may be raised with more facility, are fattened with less grain, and make more delicious food.

DUCK. Of the duck there are many varieties; but they may be reduced to two general classes—the wild and the tame. Of the wild duck, the canvass-backed is peculiar to America; where it is in higher estimation than any other, on account of the exquisite flavor of its flesh. It abounds in the neighborhood of Chesapeake bay; but is seldom seen north of Pennsylvania.

The Mallard is the most common of wild ducks, and is the original of our domestic duck. Wild ducks pair in the spring, build their nests among rushes near the water, and lay from ten to sixteen eggs. The female is a very artful bird, and does not always make the nest close to the water, but frequently at a good distance from it; in which case she will carry the young to it in her beak, or between her legs. There are various means used to catch wild ducks and geese, of which one seems worth mentioning. The person wishing to take these, wades into the water up to the chin, and having his head covered with a calabash, approaches the place where the ducks are; when they not regarding an object of this sort, suffer the man freely to mix with the flock; after this, he has only to pull them by the legs into the water, one after the other, till he is satisfied; returning as unsuspected by the remainder, as when he first came among them. This method is frequently put in practice on the river Ganges, using the earthen vessels of the Gentoos, instead of the calabashes; these vessels are what the Gentoos boil their rice in, and after being once used, they consider them defiled, and throw them into the river as useless. The ducks seeing these vessels float down the stream, look upon them with disregard, and the duck-takers find them, on this account, convenient for their purpose.

The tame duck is the most easily reared of all our domestic animals;

and in the neighborhood of a sufficiently sluggish and muddy stream, will procure their living and even grow fat without being fed. It is better, however, to confide them to the care of a hen, because the duck is a heedless and inattentive mother, and frequently leaves her eggs until they spoil. After hatching her brood, she forthwith leads them to a pond, shows them the water, and appears to think that she has performed every duty which is required of her.

A singular mode of fattening ducks obtains in France. In the autumn when tolerably fat, they are shut up, eight by eight, in a dark place, and crammed with boiled corn. They are sometimes suffocated, but if they are soon bled, they are not the worse for it. They pass fifteen days in a state of oppression and suffocation, which makes their livers grow large. When the tail spreads out like a fan, they are fat enough; they are then turned out to bathe, after which they are killed.

Two days after killing, they are opened below, and their wings and legs taken off, and the flesh covering the rump and stomach. The whole is put into a salting tub with the neck and end of the rump, and left covered with salt for fifteen days, after which they are cut into four quarters, and put into the pot. They are first seasoned with cloves, and other spices put in them. Some leaves of Spanish laurel, and a little salt-petre having been put into the brine to give the meat a red color.

WILD PIGEON OF AMERICA. "The wild pigeon of the United States," says Wilson, in his Ornithology, "inhabits a wide and extensive region of North America, on this side of the Great Stoney Mountains, beyond which, to the westward, I have not heard of one being seen. According to Mr. Hutchins, they abound in the country round Hudson's Bay, where they usually remain as late as December, feeding, when the ground is covered with snow, on the buds of juniper. They are spread over the whole of Canada, were seen by Capt. Lewis and his party near the great falls of the Missouri, upwards of 2500 miles from its mouth, reckoning the meanderings of the river, were also met with in the interior of Louisiana, by Col. Pike, and extend their range as far south as the Gulf of Mexico; occasionally visiting or breeding in almost every quarter of the United States.

"But the most remarkable characteristic of these birds is their associating together, both in their migrations, and also during the period of incubation, in such prodigious numbers as almost to pass belief: a circumstance which has no parallel among any other of the feathered tribes on the face of the earth, with which naturalists are acquainted.

"These migrations appear to be undertaken, rather in quest of food than merely to avoid the cold of the climate. Vast multitudes congregate in the western forests, particularly in the states of Ohio, Kentucky, and Indiana. These extensive regions abound with the beech nut, which constitutes the chief food of the wild pigeon. During their stay, they fix upon some spot in a forest as their roosting place. These roosting places sometimes occupy a large extent. When they have frequented one of these places for some time, the appearance it exhibits is surprising. The ground is covered to the depth of several inches with their excrement; all the tender grass and underwood is destroyed, the surface strewed with large limbs of trees broken off by the weight of the birds clustering one above another; and the trees themselves,

for thousands of acres, killed as completely as if girdled with an axe. The marks of this desolation remain for many years on the spot; and numerous places could be pointed out where, for several years after, scarce a single vegetable made its appearance.

"When the roosts are first discovered, the inhabitants from considerable distances visit them in the night, with guns, clubs, long poles, pots of sulphur, and various other engines of destruction. In a few hours, they fill many sacks and load their horses with them. By the Indians, a pigeon roost, or breeding place, is considered an important source of national profit and dependence for that season; and all their active ingenuity is exercised on the occasion. The *breeding place* differs from the former in its greater extent. In the western countries above mentioned, these are generally in beech woods, and often extend in nearly a straight line across the country for a great way. Not far from Shelbyville, in the state of Kentucky, about five years ago, there was one of these breeding places, which stretched through the woods in nearly a north and south direction; was several miles in breadth, and was said to be upwards of forty miles in extent. In this tract, almost every tree was furnished with nests wherever the branches could accommodate them. The pigeons made their first appearance there about the tenth of April, and left it altogether, with their young, before the 25th of May.

"To form a rough estimate," continues Mr. Wilson, "of the daily consumption of one of these immense flocks, let us first attempt to calculate the numbers of that above mentioned, as seen in passing between Frankfort and the Indiana territory. If we suppose this column to have been one mile in breadth,—and I believe it to have been much more, and that it moved at the rate of one mile in a minute, four hours, the time it continued passing, would make its whole length two hundred and forty miles. Again, supposing that each square yard of this moving body comprehended three pigeons, the square yards in the whole square multiplied by three, would give two thousand two hundred and thirty millions, two hundred and seventy-two thousand pigeons! an almost inconceivable multitude, and yet probably far below the actual amount. Computing each of these to consume half a pint of mast daily, the whole quantity, at this rate, would equal seventeen millions four hundred and twenty-four thousand bushels per day. Heaven has wisely and graciously given to these birds rapidity of flight, and a disposition to range over vast uncultivated tracts of the earth; otherwise they must have perished in the district where they resided, or devoured the whole productions of agriculture, as well as those of the forest.

"Happening to go ashore one charming afternoon, to purchase some milk at a house that stood near the river, and while talking with the people within doors, I was suddenly struck with astonishment, by a loud rushing roar, succeeded by instant darkness, which, at the first moment, I took for a tornado, about to overwhelm the house, and every thing around in destruction. The people, observing my surprise, said coolly, 'it is only the pigeons,' and on running out, I beheld a flock, thirty or forty yards in width, sweeping along, very low, between the house and the mountain, or height that formed the second bank of the river. These continued passing for more than a quarter of an hour,

and at length varied their bearing, so as to pass over the mountain, behind which they disappeared before the rear came up."

CARRIER PIGEON. This is a name given to a variety of the tame pigeon or house dove, from being sometimes employed to convey letters, or small packets, from one place to another. Mention is made of them by ancient writers. Modern history records several interesting accounts of the employment of these aerial messengers. "When the city of Ptolemais, in Syria," says the Percy Anecdotes, "was invested by the French and Venetians, and it was ready to fall into their hands, they observed a pigeon flying over them, and immediately conjectured that it was charged with letters to the garrison. On this, the whole army raising a loud shout, so confounded the poor aerial post, that it fell to the ground; and on being seized, a letter was found under its wings, from the sultan, in which he assured the garrison that "he would be with them in three days, with an army sufficient to raise the siege." For this letter the beseigers substituted another, to this purpose, "that the garrison must see to their own safety, for the sultan had such other affairs pressing him, that it was impossible for him to come to their succor;" and with this false intelligence, they let the pigeon pursue his course. The garrison, deprived by this decree of all hopes of relief, immediately surrendered. The sultan appeared on the third day, as he had promised, with a powerful army, and was not a little mortified to find the city already in the hands of the Christians."

"Carrier pigeons were again employed, but with better success, at the siege of Leyden, in 1675. The garrison were, by means of the information thus conveyed to them, induced to stand out, till the enemy, despairing of reducing the place, withdrew. On the siege being raised, the Prince of Orange ordered that the pigeons, which had rendered such essential service, should be maintained at the public expense, and that at their death, they should be embalmed and preserved in the town house, as a perpetual token of gratitude.

"In the East, the employment of pigeons for the conveyance of letters, is still very common; particularly in Syria, Arabia, and Egypt. They are also employed in several parts of Europe, but rather for the purposes of amusement, than for objects of great utility.

"The diligence and speed with which these feathered messengers wing their course, is extraordinary. From the instant of their liberation, their flight is directed through the clouds, at an immense height, to the place of their destination. They are believed to dart onwards, in a straight line, and never to descend, except when at a loss for breath, and then they are to be seen, commonly at dawn of day, lying on their backs, on the ground, with their bills open, sucking in with hasty avidity, the dew of the morning. Of their speed, the instances related are almost incredible.

"Some years ago, a gentleman sent a carrier pigeon from London by the stage coach, to his friends in Edmundsbury, together with a note, desiring that the pigeon, two days after the arrival there, might be thrown up, precisely when the town clock struck nine in the morning. This was done, accordingly, and the pigeon arrived in London, and flew to the Bull Inn, in Bishopgate street, into the loft and was there shown at

half an hour past eleven o'clock, having flown seventy-two miles, in two hours and a half.

"It is through the attachment of the animals to the place of their birth, and particularly to the spot where they have brought up their young, that they are thus rendered useful to mankind.

"When a young one flies very hard at home, and is come to its full strength, it is carried in a basket, or otherwise, about half a mile from home, and then turned out; after this, it is carried a mile, then two, four, eight, ten, twenty, &c., till at length it will return from the furthermost parts of the country."

# PART III.

## PRESERVATION OF HEALTH, &C.

Every one is liable to suffering, either from accident or disease. Yet it is certain that a large proportion of the accidents which occur, as well as many of the diseases which afflict mankind, are the result of carelessness and neglect. Less haste, or a little more forethought, would often save a bone from being broken; and a little more attention to diet, air, exercise, cleanliness, moderation in drink, needless exposure, &c. &c., would frequently prevent dangerous and protracted illness, and especially those chronic diseases, which, if less immediately dangerous, occasion suffering and distress, perhaps through life.

Yet it is nevertheless true, that accidents and diseases will sometimes occur. They will occur suddenly and unexpectedly. A physician may not be within immediate call; and before he can be summoned, life may have become extinct, or the foundation laid for months of debility and suffering.

Such calamities, it cannot be doubted, might not unfrequently be prevented by a little knowledge of the human frame, and of a few simple medicines or expedients easily comprehended; almost always at hand, and which every person of common understanding may administer and apply.

Without, therefore, infringing upon the province of the regularly bred physician, or appearing to advocate empyricism, the editor believes an article devoted to the prevention of diseases and accidents, and the management of the latter more especially, which shall be divested of the technical language of the profession—may be useful to those families for which this work is designed.

It is needless to say that a regular treatise on surgery and practice is not here attempted. Such an attempt would justly subject the conductor of this work to ridicule; nor will it fall within the object and scope of this part of the work to sanction "nursery gossip"—nor to countenance and spread abroad the "mendacious reports of nostrum makers and venders." But rather to select such hints on the subject of preserving the health, and to recommend such remedies for certain accidents, as have

been furnished by enlightened experience, and which are safe and useful in the hands of the professionally unlearned.

Hence, it will be obvious, that this article is not designed for the critically learned. Should such an one, to use the language employed in an admirable work of a similar character, and written by a distinguished physician—"cast his eyes on these pages, he will here learn, this book was written for the unlearned; and he will also learn that a handkerchief tied loosely around a man's leg, above a wounded and bleeding artery, and a stick twisted into it, will as effectually save life as a surgeon's turniquet—and many other such things. He will therefore, please to spare this little work, for the sake of him whose house is far removed from the surgeon, and who has no money to pay the physician."

## SECTION I.

### RULES AND HINTS FOR THE PRESERVATION OF LIFE AND HEALTH, &C.

Rules of Sir H. Philips.—Rise early, and never sit up late.

2. Wash the whole body every morning with cold water, by means of a large sponge, and rub it dry with a rough towel, or scrub the whole body for ten or fifteen minutes, with flesh brushes.

3. Drink water, generally, and avoid excess of spirits, wine and fermented liquors.

4. Keep the body open by the free use of the syringe, and remove superior obstructions by aperient pills.

5. Sleep in a room which has free access to the open air.

6. Keep the head cool by washing it when necessary, with cold water, and abate feverish and inflammatory symptoms, when they arise, by persevering stillness.

7. Correct symptoms of plethora and indigestion, by eating and drinking less per diem for a few days.

8. Never eat a hearty supper, especially of animal food; and drink wine, spirits, and beer, if these are necessary, only after dinner.

Rules of Dr. Boerhaave.—The following were the simple and unerring directions of this great man, for the preservation of health; they contained the sum and substance of his vast professional knowledge during a long and useful life:—"Keep the feet warm; the head cool; and the body open." If these were generally attended to, the physician's aid would seldom be required.

Experience of Howard.—We give the following account of Mr. Howard's experience, which was furnished by him to a friend, as containing suggestions of a most important and valuable sort; and which, if adopted by many of the dyspeptics of the day, would go farther to-

ward their restoration to a healthful state of body and mind, than the most learned prescriptions of the most celebrated doctors.

"A more 'puny whipster,' than myself in the days of my youth, was never seen. I could not walk out in the evening, without being wrapped up; I could not put on my linen without its being aired; I was, politely speaking, enfeebled enough to have *delicate nerves*, and was occasionally troubled with a very genteel hectic. To be serious, I am convinced that whatever enfeebles the body debilitates the mind, and renders both unfit for those exertions which are of such use to us all as social beings. I therefore entered upon a reform of my constitution, and have succeeded to such a degree, that I have neither had a cough, cold, the vapors, nor any more alarming disorder, since I surmounted the seasoning. Prior to this, I used to be a miserable dependant on wind and weather; a little too much of the one, or a slight inclemency of the other, would postpone, and frequently prevent, not only my amusements, but my duties; or, if pressed by my affections, or by the necessity of affairs, I did venture forth in despite of the elements, the consequences were equally absurd and incommodious, not seldom afflictive. I muffled up even to my nostrils; a crack in the glass of my chaise was sufficient to distress me; a sudden slope of the wheels to the right or left, set me a trembling; a jolt seemed like a dislocation, and the sight of a bank or precipice, near which my horse or carriage was to pass, would disorder me so much that I would order the driver to stop, that I might get out and walk by the difficult places. Mulled wines, spirituous cordials, and large fires, were to comfort me and keep out the cold, as it is called, at every stage, and if I felt the least damp in my feet, or other parts of my body, dry stockings, linen, &c., were to be instantly put on; the perils of the day were to be baffled by something taken hot on going to bed; and before I pursued my journey, the next morning, a dram was to be swallowed, in order to fortify the stomach. In a word, I lived, moved, and had my being so much by rule, that the slightest deviation was a disease.

"Every man must, in these cases, be his own physician. He must prescribe for, and practise on himself. I did this by a very simple, but, as you will think, a very severe regimen, namely, by denying myself almost every thing in which I had long indulged. But as it is always harder to get rid of a bad habit, than to contract it, I entered on my reform gradually; that is to say, I began to diminish my usual indulgences by degrees. I found that a heavy meal, or a hearty one, as it is termed, and a cheerful glass, that is, one more than does you good, made me incapable, or, at least, disinclined to any useful exertions, for some time after dinner hours; and if the dilutive powers of tea assisted the work of a disturbed digestion, so far as to restore my faculties, a luxurious supper came in so close upon it, that I was fit for nothing but dissipation, till I went to a luxurious bed, where I finished the enervating practices, by sleeping eight, ten, and sometimes a dozen hours on the stretch. You will not wonder that I rose the next morning with the solids relaxed, the juices thickened, and the constitution weakened.

"To remedy all this, I ate a little less at every meal, and reduced my drink in proportion. It is really wonderful to consider, how imperceptibly a single morsel of animal food, and a teaspoonful of liquor, de-

ducted from the usual quantity daily, will restore the mental functions, without any injury to the corporeal—nay, with increase of vigor to both. I brought myself, in the first instance, from dining on many dishes, to dining on a few, and then to being satisfied with one; in like manner, instead of drinking a variety of wines, I made my selection of a single sort, and adhered to it alone.

"My next business was to eat and drink sparingly of that adopted dish and bottle. My ease, vivacity, health and spirits augmented. My clothing, &c. underwent a similar reform; the effect of all which is, and has been for many years, that I am neither affected by seeing my carriage dragged up a mountain, or driven down a valley. If an accident happens, I am prepared for it, I mean so far as respects unnecessary terrors; and I am proof against all changes in the atmosphere, wet clothes, damp feet, night air, transitions from heat to cold, and the long train of hypochondria affections."

Hints to Students.—Students, more than most persons, are apt to bring upon themselves a train of stomachic and nervous affections, in consequence of an intense application of mind, and neglect of appropriate exercise in the open air. No one, however, can long hope for the enjoyment, either of health or vigor of mind, who is not in the daily habit of exercise abroad. It is important, also, that his study should be large, perfectly dry, and often well ventilated. Great attention should also be paid to position. Students, whether they stand or sit, and by turns they should do both, should maintain an erect posture. Care should be exercised not to press, for any length of time, against a hard substance. The rocking chairs with a leaf, or round table, situated in front of them, and which are often found in our colleges, are highly improper. It is also recommended to students, for the purpose of giving exercise and strength to the lungs, frequently to read and speak loud. But some caution will be necessary, lest the exercise be carried too far. Vociferation should never be indulged. A naturally weak voice may be greatly strengthened by exercise; and even a natural impediment removed, by careful and judicious perseverance. The case of Demosthenes illustrates this. His voice was so weak and indistinct, that he could be scarcely heard or understood; yet he contrived to remedy both defects by declaiming, while ascending the brow of a hill, or walking amid the noise of the waves along the sea shore.

We must also enter our protest against midnight studies. The late President Dwight, whose experience rendered him perfectly competent to impart advice on this subject, gave it as his opinion, that as a general rule, nothing was gained by any student, by application to his books after ten o'clock at night. The morning is the season most appropriate to study. It is also the best season for exercise. But both objects may be accomplished by early rising; a point of great importance, both in respect to clearness of mind, health of body, and rapid improvement. But in few things, perhaps, do students fail more than in the kinds of exercise adopted. They should not be those kinds which are of course violent; nor those which exercise only particular parts of the body. Great fatigue should be avoided. In general, riding on horseback, walking, or working in the garden, are to be preferred to most other kinds of exercise.

The utility of exercise, however, is often much diminished, by its being taken *as exercise*. On this point, we quote the language of a distinguished writer, as well as student: "A solitary walk, or ride, merely for the sake of exercise, and with no other object to stimulate our progress, as it is of all amusements the dullest, so it is found rather hurtful than advantageous. The mind still meditates in solitude, and the body, at the same time, labors; so that both are exhausted at once, and the student returns to his closet, fatigued, dejected, and disappointed. Some little amusement must therefore be contrived, or some business engaged in, which may operate as a loadstone, in attracting us, without being sensible of our own efforts, from our libraries, up the mountain, and along the forest, where health, with all her thousand joys, delights to fix her abode."

With regard to diet, no good reason exists why the student should deny himself any plain and wholesome food, provided that he eats not to complete satiety. This should always be avoided, as should supper late in the evening.

And in regard to drink, water, doubtless, should constitute his principal drink. But more than most persons, should the student abstain from the use of spirituous liquors. They are a bane, to which none of the habits of life present any antidote whatever. The laborer in the field, by his powerful exercise, may perspire away in a measure, the effects of stimulating liquors; but the student in his application, has no such effect to anticipate. Stimulating liquors, and close study, will soon undermine and destroy the best constitution ever given to man.

QUANTITY OF FOOD. In respect to the quantity of food adapted to the preservation of health, perhaps no invariable rule can be given. "As a general rule," observe the authors of the Journal of Health, "it will be found that those who exercise much in the open air, or follow laborious occupations, will demand a larger amount of food than the indolent, or the sedentary. Young persons, also, commonly require more than those advanced in years; and the inhabitants of cold, more than those of warm climates. We say this is a *general* rule; for very many exceptions are to be found in each of these particulars. Thus, we not unfrequently find, that one individual requires more food to support his system, than another of the same frame of body and trade, and who partakes of the same degree of exercise. In fact, one person will support his strength, or even become more robust upon the same quantity of food, which will occasion in another debility and emaciation."

In general, persons eat by far too great quantity of food. The digestive powers are constantly put upon the stretch, and the ultimate effect is, that they become weakened, and incapable of converting into nutriment, a quantity of food, essential to a vigorous state of the system. It should not be forgotten—an observation we believe of the celebrated Dr. Abernethy—that it is not the quantity of food which is eaten, but the quantity *digested*, which administers to the support of the body. Hence, all that is consumed beyond the point of easy digestion, tends to load and clog the machine—to impair the energies—and to render it less fit for future agreeable movements. The exact point when a person should lay aside his knife and fork, we do not, and cannot perhaps determine; but each one may judge, in general, for himself. But if he experience

any sensation of oppression—any "load at the stomach"—he has eaten too much. A single mouthful taken after feeling satisfied, is injurious; indeed, we should contrive to stop short of that point.

In regard to children, a somewhat different regimen may doubtless with safety be adopted. A judicious writer remarks, "whatever regimen you prescribe for children, provided you only accustom them to plain and simple food, you may let them eat, run, and play as much as they please, and you may be sure they will never eat too much, or be troubled with indigestion. But if you starve them half the day, and they find means to escape your observation, they will make themselves amends, and eat till they are sick, or even burst."

ABSTINENCE. Abstinence is the avoiding or refraining from any thing to which there is a natural or habitual propensity. As a religious service, it has often been enjoined in various systems of religion: but in the present article we design to speak of abstinence in relation to its importance to health. As a preventive of disease, too much, perhaps, cannot be said in its favor; while wonderful effects in the cure of diseases have been ascribed to it. One of these is recorded in the history of Cornaro, a noble Venetian, who, after a life of luxury, was, at the age of forty, attacked by a disease attended with mortal symptoms; yet he not only recovered, but lived nearly one hundred years, from the mere effects of abstemiousness. We are told of several individuals that have reached a century, a century and a half, nay, have even approached to the age of two centuries, supported on an extremely slender diet, which was thought to contribute materially to the preservation of their health. It is related of Howard the celebrated philanthropist, that he used to fast, for the purpose of health, one day in the week. Franklin, for a period, did the same. Napoleon, when he felt his system unstrung, suspended his wonted repast, and took exercise on horseback. We are not of the opinion, indeed, of a French physician, that it is necessary absolutely to fast, in order to attain old age; but occasional fasting powerfully tends to renew the energies of the system, as the stopping of grinding at the mill presents an opportunity for the head waters to increase their power. The above physician, to convince every one of the truth of his proposition, that fasting is essential, selects one hundred and fifty-two hermits, or bishops, who are known to have led a strictly temperate life—frequently fasting, and regularly alternating their studies and religious observances, with bodily labor, or distant journeys for purposes of charity, and other duties. These he compares with the same number of academicians, one half from the Academy of Sciences, and the other half from that of Belles-lettres. On the one side, their joint lives amounted to 11,589 years, and on the other, only 10,511; hence he concludes, that even frequent fasting would prolong the lives of men of letters more than seven years.

Whatever deductions might be made from the above account, certain it is, that a moderate diet, with occasional fasting, is essential to uninterrupted health, and cheerful spirits. It is related of Sir Isaac Newton, that while he was composing his celebrated treatise on Optics, he confined himself entirely to bread, with a little sack and water. Gen. Elliott, the defender of Gibraltar, during eight of the most anxious days of the siege, lived upon four ounces of rice per day. Most of the stand-

ard works of English literature were composed by men whose circumstances compelled them to adopt a spare diet—they fasted often times from necessity rather than choice: yet their ideas were doubtless proportionately more clear—their conceptions more rapid and bold. President Edwards, in his diary, records it as the result of his experience, that he was more sprightly and healthy, both in body and mind, for the practice of self-denial, in eating and drinking. "By a sparing diet," says he, "and eating (as much as may be) what is light and easy of digestion, I shall doubtless be able to think clearer, and shall gain time, first by lengthening out my life. Secondly, shall need less time for digestion after meals. Thirdly, shall be able to study closer without wrong to my health. Fourthly, shall need less time to sleep. Fifthly, shall seldom be troubled with the head ache." It was the reply of Cardinal de Sallis, archbishop of Seville, who died at the advanced age of one hundred and ten years, when asked what rule he had observed to preserve his health, "Why," said he, "by being old when I was young, I find myself young, now when I am old." Shakspeare has well expressed the same idea in one of his plays.

"Though I look old, yet I am strong and lusty:
For in my youth I never did apply
Hot and rebellious liquors in my blood;
Nor did not, with unbashful forehead, woo
The means of weakness and debility.
Therefore, my age is a lusty winter—
Frosty, but kindly."

*As You Like It.—Act II. Scene* 3.

"Most of the chronical diseases, the infirmities of old age, and the short periods of the lives of Englishmen," said Dr. Cheyne, more than a hundred years ago, "are owing to repletion."

"I tell you honestly," says Mr. Abernethy, "what I think is the cause of the complicated maladies of the human race: it is their gormandizing, and stuffing, and stimulating their digestive organs to excess, thereby producing nervous disorders and irritation."

"It is the opinion of a majority of the most distinguished physicians," says another medical writer, "that intemperance in diet destroys the bulk of mankind; in other words, that which is eaten and drank, and thus taken into the habit, is the original cause of by far the greatest number of diseases which afflict the human race."

Abstinence, after excessive fatigue, or rather peculiar moderation in respect to eating and drinking, is important for all. This perhaps will not be doubted in relation to men of sedentary habits. But its importance is not much less to farmers, who, after the toils of the day are wont to indulge a heightened appetite to complete satiety. This is wrong. For however they may think that when the machine is exhausted, it requires *much* refreshment, a slight examination of the effects of repletion, will be sufficient to condemn the practice. "For after eating and drinking copiously under such circumstances," remarks Wallace, in his Art of Preventing Diseases, "the system grows dull and heavy, and general lassitude comes on; the pulse grows quick, the face flushes, a temporary fever ensues: the skin is dry—the mouth clammy; thirst attends, and in the place of that recruited strength, alacrity and cheer-

fulness they expected to obtain from their hearty meal and night's repose, they arise in the morning, after a few hours of disturbed sleep, weary and depressed with pain, or stiffness in the joints, an aching head, and a stomach loathing its accustomed food. Nor can it be otherwise; for the digestive powers of the stomach, in that state of exhaustion induced by fatigue, are incapaple of performing the task to which they are excited; and the load of food which is taken in place of recruiting the strength and activity of the system, is a cause of suffering and disease, extending from the stomach itself to the residue of the system."

EXERCISE. In our hints to students, we have alluded to the important subject of exercise. It deserves, however, a more serious and extended notice. At the present day, exercise, temperance, and pure air, none of which are costly articles, are considered indispensable to health. "These constitute the arcana of health and longevity; and it is curious, that man should so often evince a total disregard for those principles on which his existence depends. Exercise of too violent nature, and a total want of it, are attended with equal disadvantages. Violent exercise is very injurious to those persons who are unaccustomed to it, particularly where excesses in eating and drinking have been committed. All sudden transitions from a state of rest to violent action are extremely injudicious, particularly in hot weather. Exercise admits of being diversified; viz. walking, running, leaping, swimming, riding, different games, gardening, &c. Passive exercise, which consists of riding in a carriage, sailing, friction, swinging, &c., is better calculated for debilitated constitutions, particularly the asthmatic and consumptive. At all times, that exercise is to be preferred, which with a view to brace and strengthen the body, we are most accustomed to; and it should always be began and finished gradually. Exercise should never be taken before a meal, when the body is in a state of perspiration, as digestion might be thereby retarded; and for the same reason, it is also hurtful if taken immediately after a meal. By walking, the appetite and perspiration are promoted; the mind is enlivened by the change of scene, the lungs are strengthened, and the contraction of the legs is relieved. The inhabitants of large towns require longer walks than those who breathe a pure atmosphere; therefore, those who lead sedentary lives, or are troubled with nervous affections, should use daily exercise, but it should be that species which is agreeable to the feelings. Exercise ought only to be continued till an agreeable perspiration is felt; if carried further, instead of the body being strengthened, it will be weakened. The thirst generally felt after exercise must not be immediately satisfied by cooling drink."

FRICTION. One of the most gentle and useful kinds of exercise, is friction of the body, either by the naked hand, a piece of flannel, or, what is still better, a flesh brush. This was in great esteem among the ancients, and is so at present in the East Indies. The whole body may be subjected to this mild operation, but chiefly the belly, the spine, or back-bone, and the arms and legs. But, in rubbing the belly, the operation ought to be performed in a circular direction, as being most favorable to the course of the intestines, and their natural action. "It should be performed," says Sir A. Cooper, "in the morning, on an empty stomach or rather in bed, before getting up, and continued, at least for some minutes at a time."

AIR. The air, or atmosphere, which we breathe, is a compound, consisting of *oxygen* and *nitrogen*, in the proportion of 21 or 22 parts of the former, to 78 or 79 of the latter. In neither of these elements alone, could we live; by the former, we should be so exhilarated, as quickly to exhaust our vital powers; in the latter, we should die instantly. But Providence has so proportioned them, as to render them fitted for respiration, and in that proportion, they contribute to health.

Whenever the above proportion of oxygen is seriously altered, or its due supply withheld, the lungs must suffer, and with them the heart and circulation also. Various causes may operate to injure the vitality of the air. In a tight room, candles may consume so much of the oxygen as to render it less fitted for the purposes of respiration; or, carbonic acid gas, otherwise called *choke-damp*, may become mingled with it, and render it incapable of sustaining life. This often occurs in wells and caverns; or, it may become vitiated or impure by being repeatedly breathed, as is sometimes the case when a large number of persons are crowded together, in a small and confined apartment. In the process of respiration, air undergoes an important change. Nothing is lost, indeed, in respect to weight; but the oxygen, combining with the carbon found in the blood, forms carbonic acid gas, and in that form, is the air found, as it issues from the air cells of the lungs. Hence, it soon becomes entirely unfitted for respiration, and incapable of supporting either life or combustion. The memorable history of the English prisoners in Calcutta, who were crowded into a room eighteen feet square, partly under ground, and having only one small opening to the light and air of day, is probably familiar to our readers. Of the whole number, 146, who were confined in that single apartment, only from eight o'clock at night until six the next morning, but 23 were living. In this case, the heat which was generated produced a sudden and high fever, and the carbonic acid given out by the crowd in breathing, produced the awful effects above related. Few persons can estimate the importance of pure air to a healthy state of the system, or to persons who are suffering under disease, especially fevers. Apartments in which the sick are confined, should, in general, be well ventilated, and this may be easily effected, without exposing the patient to a current of air, which is always to be avoided.

SLEEP. If exercise be important and even indispensable to health, as has been remarked in a preceding article, not less so is sleep; and constitued as we are, it is a wise provision of the Author of Nature, that night comes at proper intervals, when the exhausted energies of the system may be revived by "tired nature's sweet restorer." And here it may be observed, in borrowed language, that "night is evidently the period appropriated by nature for repose, and general experience has proved that it is the only one during which we can, with certainty, obtain that sound, sweet, and refreshing slumber, so necessary for the preservation of health. Sleep during the day is, indeed, on many accounts, a pernicious practice, which should be carefully avoided, excepting under particular circumstances of disease, or when a sufficient amount of repose cannot be obtained at the natural periods. This, however, does not apply to infants. For the first months after birth, a healthy child sleeps full two thirds of its time. This propensity requires to be indulged by day as well as by night; but, with judicious

management, it may be brought, in a short time, to require and enjoy repose during the latter period only. Young children, when fatigued by exercise, will also, in general, be found inclined to sleep during the day; from indulging them in a short repose, under such circumstances, no bad effects can result, provided their clothing be sufficiently loose, so that every part of their bodies be freed from bands or ligatures.

"The popular maxim 'early to bed and early to rise,' is one which should be rigidly observed by every individual. It has been remarked that, in the natural state, the disposition to sleep usually comes on soon after the commencement of darkness; and, according to the oldest and most accurate observers, three or four hours' sleep before midnight, is very nearly as refreshing as double that portion in the morning. Persons who spend the day in manual labor, or active exercise in the open air, with great difficulty keep awake for a few hours after the night has closed in, and this disposition to early sleep is, perhaps, one of the strongest indications of perfect health.

"Early rising is equally important to the health of the system, as early rest. On no account should any one permit himself to again slumber, after the moment of his first awaking in the morning, whether this happen at the early dawn, or before the sun has risen; even though from accident or unavoidable causes, he may not have enjoyed his six or eight hours of repose. It is much better to make up the deficiency, if necessary, at some other time, than to attempt taking *another nap.* Whoever will accustom himself thus to rise, will enjoy more undisturbed sleep during the night, and awake far more refreshed, than those who indolently slumber all the morning.

"Even this second nap is, however, by no means so injurious to health, as the practice of continuing in bed of a morning, long after waking; nothing tends, especially in children, and young persons generally, more effectually to unbrace the solids, exhaust the spirits, and thus to undermine the vigor, activity, and health of the system, than such a practice.

"Let any one who has been accustomed to lie in bed till eight or nine o'clock, rise by five or six, spend an hour or two in walking, riding, or any active diversion in the open air, and he will find his spirits more cheerful and serene throughout the day, his appetite more keen, and his body more active and vigorous.

"No one should retire to rest immediately after a full meal, or in an agitated state of mind. Indeed, after a light supper, at least two hours ought to elapse before bed-time; and as a requisite for sound and invigorating repose, it is necessary to banish all anxious, gloomy, or depressing ideas and thoughts, and every species of mental exertion. To the same intent, every circumstance calculated to excite the senses should be removed. The pernicious practice adopted by many, of reading in bed until they fall asleep, is particularly to be avoided. In place of this dangerous expedient to invite sleep, it would be more salutary to walk up and down the room for a few minutes, or to partake of any other gentle exercise. Fortunately, however, the individual who lives a life of temperance and virtue, and partakes daily of sufficient active exercise, requires no opiate to lull him to repose:

———"On him the balmy dews
Of sleep with double nutriment descend."

SLEEPING APARTMENTS. A sleeping apartment is one of the most important rooms in a house; and cannot well fail to have either a beneficial or injurious influence upon the health, as it is well or ill suited to the purpose to which it is appropriated.

"It is all important," observes the Journal of Health, "that the largest and most lofty room, upon the second floor, be appropriated for the sleeping apartment, and that it be freely ventilated, during the day time, at all seasons, when the weather is not rainy, or otherwise very humid. There are few houses, the rooms of which are so situated as to render the latter impracticable; and the influence of the practice upon the health of the inmates, is too important to permit its being neglected from any slight cause.

"A bed-chamber should be divested of all unnecessary furniture, and unless of considerable size, should never contain more than one bed. There cannot be a more pernicious custom than that pursued in many families, of causing the children, more especially, to sleep in small apartments, with two or three beds crowded into the same room.

"The practice of sleeping in an apartment which is occupied during the day, is extremely improper. Perfect cleanliness and a sufficiently free ventilation, cannot, under such circumstances, be preserved, especially during cold weather; hence, the atmosphere becomes constantly more and more vitiated, and altogether unfit for respiration.

"A person accustomed to undress in a room without fire, and to seek repose in a cold bed, will not experience the least inconvenience, even in the severest weather. The natural heat of his body will very speedily render him even more comfortably warm, than the individual who sleeps in a heated apartment, and in a bed thus artificially warmed, and who will be extremely liable to a sensation of chillness as soon as the artificial heat is dissipated. But this is not all—the constitution of the former will be rendered more robust, and far less susceptible to the influence of atmospherical vicissitudes, than that of the latter.

"All must be aware, that in the coldest weather, a fire in the bedchamber can only be necessary during the periods occupied in dressing and undressing. When the individual is in bed, it is not only altogether useless, but to a certain extent injurious. It might be supposed, however, that bad effects would result from rising out of a warm bed of a morning, in a cold chamber. We are assured, however, that if the business of dressing be performed with rapidity, and brisk exercise be taken, previously to entering a warm apartment, they who would pursue this plan, would render themselves less dependent for comfort upon external warmth—a circumstance of very great importance as a means of guarding against colds, coughs, and consumptions.

"We would advise those who are so excessively delicate as to be incapable of passing a few minutes morning and evening, in a cold room, to seek some more genial climate—to such our winter cannot fail to be a season of constant suffering, if not of actual danger.

"A practice equally imprudent with that of occupying a heated bedchamber during cold weather, is the one very commonly pursued, of attempting to reduce the temperature of this apartment in summer, by leaving the windows open at night. Many persons have experienced

serious and irreparable injury to their health, by being in this manner subjected, whilst asleep, to a current of cold air from without.

"While a free admission of air is permitted throughout the day, the direct rays of the meridian sun, being, however, at the same time, as much as possible excluded, the windows of the bed chamber should be invariably closed after night."

BEDS. Writers on the means of preserving health, have much to say, and not without reason, upon the subject of beds. Few, perhaps, are sufficiently aware of the enervating tendency of feather beds, especially for youth; and even for persons of maturer years, it cannot reasonably be doubted, that they greatly impair the strength, especially in the warmer season, by increasing the heat to an unnatural degree, and inducing a more profuse perspiration, than is consistent with the continuance of health.

The best bed, under almost any circumstances, is a matrass, composed of hair or moss. Cotton, however, will answer well. With a proper amount of covering, such a bed will be found sufficiently warm for health and comfort, during even the severest nights of winter.

Should it be said that an exception should be made in respect to infants, it may be observed that during infancy a greater degree of warmth is at all times demanded than is necessary, or would be proper, in after life; but, as an infant should never be allowed to sleep alone, it can always be preserved of a sufficient temperature, without having recourse to the doubtful expedient of subjecting it to immersion in a bed of feathers.

Doctor Darwin has advised that young children "should not lie on *very hard* beds, as it may occasion them to rest on too few parts at a time, which hardens these parts by pressure, and prevents their proportionate growth." A bed, such as is here described, would most undoubtedly be improper at any period of life. There is a very material difference, however, between a soft and elastic matrass, and a bed so hard as to occasion uneasiness to the parts with which it is in contact. From sleeping on the former, even the most delicate need not be deterred, by any apprehensions of the injurious consequences to which the doctor alludes.

"If any feather beds be admissible, it is in the case of the aged, who are nearly as susceptible to the influence of cold as infants; to such, therefore, a warm bed is often a matter of indispensable comfort.

"Feather pillows are not less injurious than feather beds. By preserving the head of an immoderate warmth, they are apt to induce catarrhs, and, in the young, may become the remote or exciting cause of inflammation in the ear—eruptions—pain of the head, or even more serious diseases. For the same reason, all coverings for the head at night, excepting in the instance of females who are accustomed to wear a cap during the day, are productive of bad effects. Children therefore, of both sexes, should be accustomed from an early age to sleep with the head bare—the covering with which nature has, in general, so plentifully supplied this portion of the body, being amply sufficient to protect it from cold.

"After what has been said above upon the injurious tendency of sub-

jecting the body to an undue degree of heat, during the period of repose, cautions against an excess of bed clothes would appear unnecessary. It is all important that the body be covered with a sufficiency of clothing to preserve it comfortably warm; and this may be effected during health, and in individuals accustomed to exercise, by fewer blankets, coverlets, and comfortables than many are accustomed to pile upon the bed.

"So injurious is an excess of heat during repose, esteemed by Dr. Beddoes, that he has advised, and with great propriety, that young persons, especially when they present symptoms of languor and debility, or complain of unrefreshing sleep, should be examined when in bed, 'and if found too warm, awakened without compunction,'—the bed clothes should then be thrown off, 'or if the dry heat of the surface be considerable,' he adds, 'it will be best to walk up and down the room in a dress so contrived as to guard the extremities from chill, while it permits the residue of the body to be freely ventilated.' Cool rooms, mattrasses, and light bed clothes, will in all cases prevent the necessity of having recourse to the expedient here directed.

"A proper night dress is an object of no little importance. A loose flannel gown for winter, and one of muslin for summer, will be found the most proper, more especially for children. No part of the clothing worn during the day, ought, in fact, to be retained at night. Those, in particular, who are accustomed to wear flannel, will find it advantageous to dispense with it whilst in bed—or to exchange it for an under dress of cotton. Whatever dress is adopted, it should be free from every species of ligature, particularly in those parts which encompass the neck or the extremities. This is an all important caution, from a neglect of which serious injury has repeatedly resulted.

"Closely shrouding a bed with curtains, is one of those numerous instances in which the requisitions of fashion are found to be opposed to health. By preventing a free circulation of the air, they oblige the individual who reposes within them, to breathe an atmosphere vitiated by repeated respiration. They become likewise receptacles for fine particles of dust, which are liable to be inhaled during sleep, whenever disturbed by the motion of the curtains or of the bedstead; this alone, according to Willich, is a cause to which many young persons may refer the first developement of a consumptive attack.

"Equally pernicious is the practice of sleeping with the face enveloped in the bed clothes, as well as that most ridiculous custom, so prevalent in this country, of suspending a curtain over the front of an infant's cradle.

"Their own feelings might be supposed sufficient to induce all to assume in bed that position, in which every portion of the body will be left the freest from constraint; yet in the case of children, some cautions may be necessary, in order to prevent an awkward position from being indulged in, calculated to produce a prejudicial effect upon the symmetrical growth, and perfect developement of the system. Hence it is prudent, when young persons lie upon their backs, to reduce the size of the pillows, in order to guard against a contortion of the spine; while lying on the side requires pillows sufficiently large to fill up the space between the head and point of the shoulder. A constrained posi-

tion if it have no other bad effect, is a certain preventive to sound and refreshing sleep.

"Beds should never be placed upon the floor, as it is well known that in all apartments occupied by living beings, the inferior portions of the atmosphere are always the most impure. The most wholesome situation for the bed is in the middle of the room, and raised some feet from the floor. From the vitiated state of the air immediately above the latter, and the great importance of a free ventilation, the practice of placing the children's bed beneath another bedstead, during the day, cannot be too severely reprobated."

CLEANLINESS. It would be quite idle to attempt to prove, in a formal manner, the importance of cleanliness to individual comfort, and health; because he who should soberly maintain the contrary, would be entitled to no better appellation than that of a fool or madman.

On viewing the surface of the skin, even with the naked eye, we find it porous, but by means of a good glass, these pores will be discovered to be very numerous. The object of these pores is to give out perspiration, and when abundant, it appears in what is called sweat. Besides this, there is also a discharge of an oily fluid, also carbonic acid gas, and nitrogen or azote. These discharges are all essential to health. Hence, when the pores become closed by the disuse of water, or from any other cause, cold, rheumatism, eruptions, &c., are the consequence.

Shall we wonder, therefore, that medical writers insist so much on the importance of frequent ablutions, and of a change of linen in respect to our persons, beds, &c. Hufeland, a distinguished writer, gives us the following rules for preserving cleanliness, and a sound state of the skin, and which, in his opinion, if properly observed, would tend to the prolongation of life.

1. "Remove carefully every thing that the body has secreted, as corrupted or prejudicial. This may be done by changing the linen often; daily, if it be possible, and also the bed clothes, or at least the sheets; by using instead of a feather bed, a mattrass which attracts less dirt; and by continually renewing the air in the apartments, and particularly in one's bed chamber.

2. "Let the whole body be washed daily with cold water, and rub the skin strongly at the same time, by which means it will acquire great deal of life and vigor.

3. "One ought to bathe once a week the whole year through, in tepid water; and it will be of considerable service to add to it some soap."

BATHING. Bathing is a practice coeval with mankind. The ancient Greeks, Romans, and Germans, as well as the Persians, Turks, and especially the modern Egyptians, enjoy the comforts and luxuries procured by bathing, in a degree of which we can scarcely form an adequate conception. Considered as a species of universal domestic remedy, as one which forms the basis of cleanliness, bathing in its different forms, may be pronounced one of the most extensive and beneficial restorers of health and vigor. Baths may be considered as *cold*, *cool*, *warm* and *hot*.

COLD BATHS. Cold baths are those of a temperature varying from the 33d to the 55th degree of Fahrenheit's thermometer. The general properties of the cold bath, consist in its power of contracting the animal fibres, and imparting action and energy to the system. It cannot be resorted to, however with advantage and safety in certain cases, as—1. " In a full habit of body, or what is called general *plethora*, on account of the frequent febrile disposition attending such individuals. 2. In hemorrhages or fluxes of blood, open wounds or ulcers, and every kind of inflammation, whether external or internal. 3. In obstructions of the intestines, or habitual costiveness. 4. In affections of the breast and lungs, such as difficult respiration, short and dry coughs, &c. 5. When the whole mass of the fluids appear to be vitiated, or tainted, with a peculiar acrimony, which cannot be easily defined, but is obvious from a sallow color of the face, slow healing of the flesh when cut or bruised, and from a scorbutic tendency of the whole body. 6. In gouty and rheumatic paroxysms. 7. In cutaneous eruptions which tend to promote a critical discharge of humors by the pores. 8. During pregnancy; and 9. In a distorted or deformed state of the body, except in particular cases, to be ascertained by professional men."

In respect to the cold bath, the following things should be observed. 1. " It is a vulgar error, that it is safer to enter the water when the body is cool, and that persons heated by exercise, and beginning to perspire, should wait till they are perfectly cooled. Thus, by plunging into it, in this state, an alarming and dangerous chillness frequently seizes them, and the injury sustained is generally ascribed to their going into it too warm; while it doubtless arises from the contrary practice." Dr. J. Currie, of Liverpool, in his valuable " Treatise on the Effects of Water in Fevers," says, with equal truth and precision, that " in the earlier stages of exercise, before profuse perspiration has dissipated the heat, and fatigue debiliated the living power, nothing is more safe, according to my experience, than the cold bath. This is so true, that I have, for some years, constantly directed infirm persons to use such a degree of exercise, before immersion, as may produce some increased action of the vascular system, with some increase of heat, and thus secure a force of re-action under the shock, which otherwise might not always take place. But, though it be perfectly safe to get into the cold bath in the earlier stages of exercise, nothing is more dangerous than this practice, after exercise has produced profuse perspiration, and terminated in languor and fatigue; because, in such circumstances, the heat is not only sinking rapidly, but the system parts more easily with the portion that remains." In short it is a rule liable to no exception, that moderate exercise ought always to precede cold bathing, to promote the re-action of all the vessels and muscles, on entering the water; for neither previous rest, nor exercise to a violent degree, are proper on this occasion.

2. The duration of every cold bathing applied to the whole body ought to be short, and must be determined by the bodily constitution, and the sensations of the individual; for healthy persons may continue much longer in it than valetudinarians; and both will be influenced by the temperature of the air, so that in summer they can enjoy it for an hour, when in spring or autumn, one or two minutes may be sufficient.

Under similar circumstances, cold water acts on aged and lean persons with more violence than on the young and corpulent; hence the former even in the hottest days of summer, can seldom with safety remain in the bath longer than a quarter of an hour, while the latter are generally able to sustain its impressions for double that time.

3. The head should first come in contact with the water, either by immersion, pouring water upon it, or covering it for a minute with a wet cloth and then diving head foremost into the water.

4. As the immersion will be less felt when it is effected suddenly, and as it is of consequence that the first impression should be uniform over the body, we must not enter the bath slowly or timorously, but with a degree of boldness. A contrary method would be dangerous; as it might propel the blood from the lower to the upper parts of the body, and thus occasion a fit of apoplexy. For these reasons, the *shower bath* is attended with considerable advantages, because it transmits the water quickly over the whole body; and, consequently, is more consistent with the rules before mentioned.

5. The morning is the most proper time for using the cold bath, unless it be in a river; in which case, the afternoon, or from one to two hours before sunset, will be more eligible; as the water has then acquired additional warmth from the rays of the sun, and the immersion will not interfere with digestion; on the whole, *one* hour after a light breakfast, or *two* hours before, or *four* hours after dinner, are the best periods of the day for this purpose.

6. While the bather is in the water, he should not remain inactive, but apply brisk general friction, and move his arms and legs to promote the circulation of the fluids from the heart to the extremities. It would therefore be extremely imprudent to continue in the water till a second chillness attacks the body; a circusmtance which would not only defeat the whole purpose intended, but might, at the same time, be productive of the most injurious effects.

Immediately after the person leaves the bath, it will be necessary for him to wipe and dry his body with a coarse and clean cloth. He should not afterwards sit inactive, or enter a carriage, unless warmly clothed, and wearing flannel next the skin; if season and circumstances permit, it will be more proper, and highly beneficial, to take gentle exercise till the equilibrium of the circulation be restored, and the vessels, as well as the muscles, have acquired a due degree of re-action.

The best place for cold bathing is in the invigorating water of the sea, or a clear river; and where neither of these can be conveniently resorted to, we recommend the *shower bath*. Its effects are doubtless more powerful than those of the common bath; and though the latter covers the surface of the body more uniformly, yet this circumstance by no means detracts from the excellence of the former, because those intermediate parts which the water has not touched, receive an electric and sympathetic impression, in a degree similar to those brought into actual contact. As every drop of water from the shower bath operates as a partial cold bath, its vivifying shock to robust indlviduals is more extensive and beneficial than from any other method of bathing.

Hence this bath is possessed of the following important advantages: 1. The sudden contact of the water may be repeated, prolonged, and

modified at pleasure. 2. The head and breast are tolerably secure, as it descends towards the lower extremities; thus, the circulation is not impeded, breathing is less affected, and a determination of blood to the head and breast is effectually obviated. 3. As the water descends in single drops, it is more stimulating and pleasant than the usual immersion, and can be more readily procured and adapted to circumstances. And 4. The degree of pressure from the weight of water is here, likewise, in a great measure prevented; nor is the circulation of the fluids interrupted, so as to render the use of this bath in any degree dangerous; a circumstance of the highest importance, because, by the ordinary immersion, persons are often exposed to injuries which they least apprehend.

COOL BATHS may be called those which are of a temperature between the 56th and 76th degrees of Fahrenheit's scale. They are of great service in all cases where cold bathing has before been recommended, and require nearly similar precautions. As their influence, however, on first entering them, is less violent, though their subsequent effects may be attended with equal advantages, it follows, that even persons of a more delicate organization may resort to them with greater safety.

With respect to rules for cool bathing, we refer the reader to those stated in the preceding article; and shall only remark that notwithstanding its effects are less perceptible while the body continues in the water, it is necessary that the bather, on coming out of it, should be wiped dry, with the greatest expedition, to prevent catarrhal affections.

WARM BATHS are such as have the temperature above the 76th, and not exceeding the 96th or 98th degree of Fahrenheit's thermometer. "Physicians, as well as patients, have hitherto been too generally accustomed to consider a warm bath as weakening the body, and useful only for the removal of certain diseases, especially those of the skin. Experience, however, has amply proved, that there can be no safer and more efficacious remedy, in a variety of chronic or inveterate complaints, than the warm bath, if properly used, and continued for a sufficient length of time. Instead of heating the human body, as has erroneously been asserted, it has a cooling effect, insomuch as it obviously abates the quickness of the pulse, and reduces the pulsations in a remarkable degree, according to the length of time the patient continues in the water. After the body has been over heated by fatigue, from travelling, violent exercise, or from whatever cause, and likewise after great exertion or perturbation of mind, a tepid bath is excellently calculated to invigorate the whole system, while it allays those tempestuous and irregular motions which otherwise prey upon, and at length reduce the constitution to a sick bed. Its softening and assuasive power greatly tends to promote the growth of the body; on which account it is peculiarly adapted to the state of such youth as manifest a premature disposition to arrive at a settled period of growth; and it has uniformly been observed to produce this singular effect in all climates.

HOT BATHS are those which have a temperature above 98 or 100 degrees of Fahrenheit, and are occasionally increased to 110 or 120 de-

grees, and upwards, according to the particular nature of the case, and the constitution of the patient. There can be no stated rules laid down for its use, as every thing depends upon the particular circumstance of each patient. No prudent person will, we trust, have recourse to a *hot* bath, without medical advice.

CONTAGION, or infection, is the communication of disease from one body to another. Without entering into the disputed points on this subject, it is probable, without debate, that some diseases are contagious; and hence the propriety of certain rules to be observed in the apartments of those who are confined by infectious disease.

1. It is of the utmost importance to the sick and their attendants, that there be a constant admission of fresh air into the room, and especially about the patient's bed. The door, or a window, should therefore be kept open both day and night, care being taken to prevent the wind from blowing directly on the patient.

2. An attention to *cleanliness* is indispensable. The linen of the patient should be often changed; and dirty cloths, &c. should be immediately put into fresh cold water, and afterwards well washed. The floor of the room should be cleansed every day with a mop, and all discharges from the patient should be immediately removed, and the utensils washed.

3. Nurses and attendants should endeavor to avoid the patient's breath, and the vapor from the discharges; or, when that cannot be done, they should hold their breath for a short time. They should place themselves, if possible, on that side of the bed from which the current of of air carries off the infectious vapors.

4. Visiters should not come near to the sick, nor remain with them longer than is absolutely necessary; they should not swallow the spittle, but should clear the mouth and nostrils when they leave the room.

5. No dependance should be placed on vinegar, camphor, or other supposed preventives, which without attention to *cleanliness* and admission of *fresh air* are not only useless, but by their strong smell render it impossible to perceive when the room is filled with bad air, or noxious vapors.

If these rules be strictly observed, an infectious disease will seldom, if ever be communicated; but if they be neglected, especially where the patient is confined to a small room, scarcely one person in fifty who may be exposed to it can resist the contagion; even infants at the breast do not escape it, though providentially less liable to be affected than adults.

Since infection originates in close, crowded, and dirty rooms, those who make a practice of admitting the fresh air, at some convenient time, every day, and of frequently cleansing and fumigating their apartments, bedding, furniture, &c., and washing the wall with quick lime, mixed with water, in the room, may be assured they will preserve their families from malignant fevers, as well as from other diseases.

The process of fumigation is as follows:

Take an equal quantity of powdered nitre, and strong vitriolic acid, or oil of vitriol (about six drachms of each are sufficient;) mix them in a tea-cup, stirring them occasionally with a tobacco pipe, or piece of glass,

the cup must be removed occasionally to different parts of the room, and the fumes will continue to arise for several hours. The oil of vitriol should be in *quantity* not *weight.*

PURIFYING AND DISINFECTING AGENTS. In connection with the preceding observation on contagion, it may be proper in this place to state, that certain purifying and disinfecting agents have within a few years been discovered, and with promise to be of the utmost importance to the world. These are the chlorides of soda and lime. Already have they been extensively used on the Continent, and are beginning to be used in the United States. By means of these, gutters, vaults, sinks, sewers, hospitals, alms-houses, may be entirely purified: and even putrefaction disarmed of its noxious and destructive influence.

The chloride of soda, which is liquid, is more expensive, and more powerful than the chloride of lime, which is in form of a white powder, and hence the former is applicable to disinfecting operations on a small scale. They are both used, mixed with more or less water, according to the intention in view. If a body is to be preserved before burial, add about a pint of the concentrated chloride of soda, to a bucket full of water, and cover the body with a sheet dipped in this solution, which must be sprinkled occasionally over the corpse. Or if the chloride of lime is employed, make a mixture of about a pound of the chloride with two buckets full of water, and proceed as before.

*For Vaults,* take two ounces of the chloride of lime to three or four pints of water, and sprinkle from time to time, by means of a watering pot.

To preserve the health of workmen employed in common sewers, a pound of the chloride of lime should be dissolved in three buckets full of water, and a bucket full of the solution should be placed by the side of the workmen, to be employed by them in washing their hands and arms, and moistening their nostrils, and for sprinkling on the filth.

*For Ships,* take a spoonful or more of either chloride, add to it a a bottle of water, and sprinkle the solution in the hold, and over the decks.

*For purifying offensive water,* mix it with the chloride of lime in the proportion of one or two ounces of the latter, to about sixty-five gallons of the former. After being thus disinfected, the water must be exposed to the air, and allowed to settle for some time before it can be drunk.

TOBACCO. The chewing of tobacco has been and is still very extensive throughout our country, and indeed throughout the world, wherever it is known. Extensive, however, as its use is, and "*bewitching,*" as Sir Hans Sloan says it is, it no longer remains doubtful, that it is a practice fraught with almost innumerable evils. Were other testimony insufficient, that of the ablest physicians of the country should decide the question. "The chewing of tobacco," says Dr. John C. Warren, as quoted by the author of Dyspepsia Forestalled and Resisted—"is not necessary or useful in any case, that I know of; and I have abundant evidence to satisfy me that its use may be discontinued without pernicious consequences. The common belief, that it is beneficial to the teeth, is, I apprehend, entirely erroneous. On the contrary, by poisoning and relaxing the vessels of the gums, it may impair

the healthy condition of the vessels belonging to the membranes of the socket, with the condition of which the state of the tooth is closely connected."

Similarly strong is the testimony of the editors of the Journal of Health. "Tobacco," say they, "is in fact, an absolute poison. A very moderate quantity introduced into the system—even applying the moistened leaves over the stomach, has been known very suddenly to extinguish life. The Indians of our country were well aware of its poisonous effects, and were accustomed, it is said, on certain occasions, to dip the points of their arrows in an oil obtained from the leaves, which being inserted into the flesh, occasioned sickness and fainting, or even convulsions and death."

It must be evident to every one, that the constant use of an article possessing such deleterious properties, cannot fail, at length, to influence the health of the system.

In whatever form it may be employed, a portion of the active principles of the tobacco, mixed with the saliva, invariably finds its way into the stomach, and disturbs or impairs the functions of that organ. Hence, most, if not all of those who are accustomed to the use of tobacco, labor under dyspeptic symptoms. They experience, at intervals, a want of appetite—nausea—inordinate thirst—vertigo—pains and distension of the stomach—disagreeable sensations of the head—tremors of the limbs—disturbed sleep, and are more or less emaciated.

Of smoking and snuffing, it will only be necessary to add that the practice is followed, in general, by the same evils which afflict the tobacco chewer. Nor is there any safety or immunity for such persons but abstinence—resolute and entire abstinence.

EFFECTS OF CERTAIN LIQUORS. The late Dr. Rush, who paid great attention to the subject, has presented us with the following view of the physical, moral and immoral effects of certain liquors upon the body and mind of men, which we appropriately assign to this place.

| *Liquors.* | | *Upon his Body.* | *Upon his Mind.* | *Upon his condition in Society.* |
|---|---|---|---|---|
| Water (to which may be added Soda water,) Molasses and water, Molasses, beer, & Small Beer, | Produce | Good appetite, Health, Sound sleep, An agreeable complexion and long life. | A peaceable disposition, Serenity of mind, Industry, and Domestic happiness. | Reputation and Wealth. |
| Cider, Perry, Wine, Porter & Strong Beer, | Produce | Strength and a power in the system to resist the extremes of heat and cold, provided they are taken in small quantities, and chiefly with meals. | Cheerfulness, Good humor, Generosity, and Social pleasures. | Friendship, Honor, Public and private confidence. |
| Punch, Toddy, Grog, Milk Punch, Slings, Flip, Egg-nog, Liquors, Bitters made with Spirits, Raw rum, Brandy, Whiskey and Spirits in the morning, The same, two or three times a day, The same every hour in the day and in the night, | Produce | Tremors in the hands. Sickness and puking in the morning. Indigestion, Belching, Hiccup, Red eyes & nose, Rose buds over the whole face, & after a while a pallid face, Fetid breath, Hoarseness, A short cough, sore and swelled legs, Pains in the limbs Burning in the palms of the hands and soles of the feet. Jaundice, Dropsy, Loss of memory and self-respect, Palsy, Apoplexy, Madness, Death. | Idleness, Peevishness, Quarrelling and scolding, Obscene conversation, Uncleanliness, Black eyes from fighting, Broken bones from falls, Adultery, Gaming, Lying, Cursing, blaspheming, Swearing, Pilfering, Stealing, Perjury, Picking pockets, House-breaking, Assaults on the highway, Murder. | Poverty discovered in a filthy house, and in ragged clothing. Debt, Detestation by family and friends. Hospital, Jail, Hard labor, Chains, A solitary cell. Disgrace, Universal contempt, Imprisonment for life, The Gallows. |

OPIUM AND LAUDANUM. In the hands of the judicious physician, opium is a valuable medicine, and both that and laudanum in certain cases indispensable. But when taken habitually, as they frequently are, to mitigate unpleasant feelings, or remove melancholy, the habit is to be placed along side of the disgusting practice of chewing tobacco, and what is worse, the awful vice of drinking to excess. In

point of morality it can make little difference whether a person stupifies his faculties by the use of brandy or opium; and among men, the infamy which is now attached to excess in the use of the former, should alike follow excess as to the latter.

"We have indeed few genuine opium eaters among us," observes the author of "Dyspepsy Forestalled and Resisted,"—more, we believe, than this author seems to be aware of—"but," continues he, "the laudanum and paregoric phial are considered almost indispensable in every family. Nor does the mother hesitate night after night to quell the cries of her infant child, by administering *increasing* doses of these poisons." Less danger, it is believed, results from this practice than this author imagines. It is not that children are so often injured; it is older folks. It is "the nervous invalid" and "the delicate votary of fashion." And in respect to their habitual use of opium and laudanum, no terms of condemnation are too severe. Truly, and even eloquently have the editors of the Journal of Health expressed their abhorrence of this practice. "However repugnant to our feelings," say they, "as rational beings, may be the vice of drunkenness, it is not more hurtful in its effects than the practice of taking laudanum." "This is not the language of exaggeration or speculative fear. We speak from a full knowledge of facts. We repeat it—the person who gives into the habit for weeks, (he may not reach to months, or if he pass those, his years will be but few and miserable,) of daily measuring out to himself his drops of laudanum, or his pills of opium, or the deleterious substance, call it tincture, solution, mixture, potion, what you will, is destroying himself as surely as if he were swallowing arsenic, or had the pistol applied to his head. The fire of disease may for a while be concealed—he may smile incredulous at our prediction; but the hour of retribution will come, and the consequences will be terrible."

WOUNDS are recent divisions of the soft parts of the body, occasioned by external causes. They are generally divided into five classes, viz. *incised, lacerated, contused, punctured, and poisoned wounds.* We propose to offer a few remarks upon the first and last kind of wounds.

INCISED WOUNDS are those which are cut with a sharp instrument. These wounds generally occur suddenly and accidentally; and not unfrequently are of so severe a nature, as to demand immediate attention, even before a surgeon can be procured. In such a case, what shall be done? The first step is to stop the bleeding. If an artery be cut, the blood is of a bright scarlet color, and gushes from the bleeding vessel in a jet with great force. In this case, the pressure of the thumb, or palm of the hand must be on the side of the wound next the heart; and if this be not sufficient, pass a handkerchief round the limb above the wound, tie its two ends together, and twist it, by means of a cane, or stick, until the blood ceases to flow so as to endanger the life of the patient. Now send immediately for a surgeon.

But, if a surgeon be not to be obtained, and the life of the patient be in danger, any discreet person may wax together three or four threads of a sufficient length, cut the ligature they form into as many pieces as you think there are vessels to be taken up, each piece being about a foot long. Wash the parts with warm water, and then with a sharp

hook, or a slender pair of pincers in your hand, fix your eye steadfastly upon the wound, and direct the handkerchief to be relaxed by a turn or two of the stick; you will now see the mouth of the artery from which the blood springs, seize it with your hook or pincers, draw it a little out, while some one passes a ligature round it, and ties it up tight, with a double knot. In this way, take up in succession every bleeding vessel you can see or get hold of.

If the wound is too high up a limb to apply the handkerchief, do not lose your presence of mind, the bleeding can still be commanded. If it is the thigh, press firmly in the groin; if in the arm, with the hand end, or ring of a common door key, make the pressure above the collar bone, and about its middle against the first rib, which lies under it. The pressure is to be continued until assistance is procured, and the vessel tied up.

If the wound is on the head, press your finger firmly on it, until a compress can be brought, which must be bound firmly over the artery by a bandage. If the wound is in the face, or so situated that pressure cannot be effectually made, or you cannot get hold of the vessel, and the blood flows fast, place a piece of ice directly over the wound, and let it remain there till the blood coagulates, when it may be removed, and a compress and bandage be applied.

But, if a vein only be cut, and this will be known by the running of the blood in an unbroken stream, and of a dark purple red color, cleanse the wound with a soft sponge, and warm water, dry the skin with a warm soft cloth, bring the parts neatly and closely together, keeping them in that position by narrow strips of sticking or adhesive plaster. The number of straps should be in proportion to the extent of the wound, and at some little distance from one another, to allow the escape of any fluid which may run from the wound. A soft compress of old linen, or lint, may be laid over the wound, thus dressed, and the whole bandaged agreeably tight. Under ordinary circumstances this dressing should not be removed until the third or fourth day, or longer. If pain or heat ensue, wet the part with spirit and water. A cooling diet and regimen should be observed, and every kind of motion and disturbance of the part avoided.

Poisoned wounds. By these are meant wounds occasioned by the bite of the mad dog, rattle snake, or by the sting of the wasp, hornet, &c.

The *signs of madness* in a dog are as follows. At the commencement, he becomes sullen—retires from the family, ceases to bark, but growls continually at strangers, and without any apparent cause, refuses to eat or drink. His gait is unsteady, nearly resembling that of a man almost asleep. At the end of three or four days, he abandons his dwelling, roving continually in every direction; he walks or runs, as if tipsy, and frequently falls.

His hair is bristled up; his eyes haggard, fixed and sparkling; his head hangs down; his mouth is open, and full of frothy slaver; his tongue hangs out, and his tail is between his legs. He has for the most part, but not always, a horror of water, the sight of which seems generally to redouble his sufferings. He experiences from time to time transports of fury, and endeavors to bite every object which

presents itself, not even excepting his master, whom indeed he begins not to recognize. Light and lively colors greatly increase his rage. At the end of thirty or thirty-six hours, he dies in convulsions.

The instant a person is bitten by a mad dog, rattle snake, or any rabid animal, or reptile, he should apply a ligature, by means of the stick above the wound, as tightly as he can well bear it, and without hesitation or delay, cut out the parts bitten, taking along with them a portion of the surrounding sound flesh. The wound should then be freely touched with caustic, or have turpentine poured into it. A decoction of Spanish flies, in turpentine, may also be applied to the skin surrounding the wound. By these means, inflammation will be excited, and suppuration follow, which may prevent the usual dreadful consequences of such accidents. As soon as the parts are cut out, take off the ligature.

Should the patient be too timid to allow the use of the knife, burn the wound very freely with caustic, and place in it a tuft of tow, or cotton, well moistened with the above decoction. The discharge of matter that follows should be kept up for some time. The only reasonable chance for safety, is found in the above plan.

The use of the chlorurets, however, in treating wounds from rabid animals, is now becoming general in France and Germany, and many satisfactory cases are recorded. M. Schoenberg, a German surgeon, states, that of three persons who were bitten by a dog, two who used the chloruret of lime, recovered from their wounds, whilst the third, who refused to submit to the treatment, died raving mad. This gentleman applies to the wounds, twice a day, a piece of lint dipped in a solution of the chloruret, and orders his patients to take three times a day, from two drachms to one ounce of the chloruret in water.

A medicine, highly recommended in hydrophobia, is said to have been lately adopted in France, viz. the injection of warm water into the veins. To make the employment of the remedy safe, and to prevent pressure of the brain, the same quantity of blood should be previously abstracted, as it is intended there should be water injected; with this precaution, it is believed the remedy is a very proper one. The blood may be set flowing from one vein, while the water is injected at another.

*For the Sting of Bees, Wasps, and Hornets*, the part may be plunged into extremely cold water, where it should be held for some time, or which, perhaps, is still more effectual, an application may be made of hartshorn or of laudanum.

*Musquito bites* may be treated in the same manner, or a solution of common salt and water, made very strong, will speedily remove the pain. Camphorated spirits, vinegar, &c., may also be used for the same purpose. A solution of Prussian blue in soft water, with which the parts are to be kept constantly moist, is a highly celebrated remedy for the stings of bees, wasps, &c. &c.

STRAINS or SPRAINS. An experienced physician holds the following language on the subject of strains.

"Strains are often attended with worse consequences than broken bones. The reason is obvious; they are generally neglected. When a broken bone is to be healed, the patient is compelled to keep quiet,

because he cannot do otherwise. But when only a joint is strained, the person finding he can still make a shift to move, is sorry to lose his time, for so trifling an accident. In this way he deceives himself, and converts into an incurable evil, what might have been removed by keeping the part easy for a few days.

Country people generally immerse a strained limb in cold water. This is very proper, provided it be done immediately, and not continued too long; in which case, the parts are relaxed, instead of being braced.

Wrapping a bandage around the strained part, is also of use. It helps to restore the proper tone of the vessels, and prevents the action of the parts from increasing the disease. It should not, however, be applied too tight. But what we recommend above all, is *ease*. It is more to be depended on than any medicine, and seldom fails to remove the complaint.

A great many external applications are recommended for sprains, some of which do good, and others hurt. The following are such as may be used with the greatest safety, viz. camphorated spirit, volatile liniment, common fomentations of bitter herbs, with the addition of spirit or brandy.

Previous to other applications, the sprained joint, should be immersed in warm soap suds, and rubbed for an hour lightly with the balls of the fingers. The evening is the best time for this operation.

TREATMENT OF FROZEN LIMBS. To thaw frozen limbs, they should be rubbed in snow, or water with ice in it, until sensibility and motion return. Due care should be taken not to break slender parts, such as fingers, ears, &c. When feeling and the power of motion are restored, continue the friction with brandy, oil of amber, tincture of myrrh, or camphorated spirit. Put the patient to bed, in a room with a fire in it; give mulled wine; and in this situation, let him remain until a perspiration appears, and a perfect recovery of sensibility takes place. If the whole body be frozen, the above prescription is to be observed. When signs of life appear, strong volatiles should be applied to the nose; blow into the lungs. Tobacco injections should never be used in cases of suspended animation.

BURNS and SCALDS. For these some persons make use of cotton bats; and if the parts are not blistered, and the injury not very extensive, the remedy is a good one; yet children will seldom endure the application of cotton wool to any serious burn. It is well to cover the surface of the cotton which is applied to the burn, with olive oil.

Others recommend the constant application of brandy, vinegar, and water mixed together, the bathing to be continued until the pain is gone. The celebrated Mr. Abernethy, however, recommends the use of the oil of turpentine, mixed with basilicon; at the same time to give the patient some warm wine, and a few drops of opium, and afterwards to place him in a warm bed. This stimulating plan of treatment, however, is not to be continued after the equilibrium of the temperature is restored. The following application for a burn has been used with great success; viz. olive oil, three ounces; lime water, four ounces—the mixture to be applied to the affected part with a feather, or camel's hair pencil.

Burns produced by gunpowder, should have the cause removed by the point of a needle, to be followed by an emollient poultice, to the part affected. In order that the most correct treatment for burns and scalds should be known, Mr. Abernethy lately recommended his pupils to dip two of their fingers in boiling water, and let them be fairly scalded; and then take them out, and dip one into a basin of cold water, and dress the other with the turpentine and basilicon. "I do not want to try, (remarked Mr. A.), I have decided already, and therefore have no occasion to scald *my* fingers." In addition to the opinion of Mr. Abernethy, we beg to subjoin that of Sir A. Cooper. "Lime water and milk have been commonly used; but oil of turpentine is the best application. Give opium and wine, as long as the chilly state continues; but as soon as the heat is developed, and the pulse has recovered its power, do not continue it any longer; other means must then be employed to reduce the inflammation.

DRESS OF CHILDREN. The dress of children should be warm, but so soft and pliable as not to obstruct the easy motion of the joints. "The absurd custom," observes the Book of Health, "of confining the body of the infant by heavy bandages, formerly prevalent, is yielding to the more rational dictates of nature and common sense; but the ridiculous length of clothing in the early periods of infancy, still keeps its ground, though equally absurd. To the child, it is a continual source of considerable uneasiness; obstruction is continually made to the freedom of circulation and breathing; and the more the child endeavors to relieve itself, the more it wastes its power, and, consequently, interferes with its growth. Be careful, therefore, not to increase the perspiration to an unnecessary degree. A short shift, and a flannel waistcoat, tied behind, with a short petticoat sewed to it, and a short gown, rather stouter in winter than in summer, are all the clothes which a child requires. If the child be weakly, a flannel shift may be useful; otherwise, too many clothes will render it tender, and susceptible of the least cold. Stockings are an unnecessary appendage, until the child be seven or eight months old; for it is beneficial to expose the legs, arms, and breasts of healthy children to the open air; the clothing of infants cannot be made too short."

DIET OF CHILDREN. "Remember, (says Mr. Abernethy,) it is not the quantity of food we eat, but the quantity we digest, which affords the nourishment to our bodies." Over-feeding, as well as improperly feeding of children, is highly injudicious; therefore the strictest attention ought to be paid to dieting. Fortunate is the child who (during the first four months of its existence) is nourished with no other aliment than the milk of its mother; but if the child be weakly, and the mother's milk insufficient, a cup of beef tea, and a crumb of bread may be daily given. At four months old, the child may be fed twice in the day; once with biscuits or stale bread, boiled in an equal mixture of milk and water, and once with light broth and bread, arrowroot, or rice. After the first six months, weak veal or chicken broth may be given; and progressively, with broth, vegetables which are not very flatulent; viz. carrots, endive, spinage, parsnips, &c. When the infant is taken early from the breast, the diet should principally consist of cow's milk warmed, and poured on bread, (first soaked in water,) and of light broth with bread: should the child be purged, the milk

must be boiled. When the child is weaned, and has acquired its proper teeth, it will be necessary to let it have small portions of meat and vegetables; also, dishes prepared of flour, as the most simple food is the most nutritive. Pastry, confectionary, heavy or compound dishes, ought to be withheld, particularly from delicate children. Potatos should be allowed only in moderation, and those not eaten with butter, but mashed up with other vegetables. It is advisable to accustom children to a certain regularity in their aliment, by giving them their meals at stated periods of the day: which will render them less subject to debility and disease, give the stomach time to recover its tone, and to collect the juices necessary for digestion. To children of four or five years old, animal food may be allowed at dinner; and bread and milk night and morning; due regard being, at all times, paid to the health and habits of the child.

SLEEP. "Infants, from the time of their birth, should be encouraged to sleep in the night in preference to the day; therefore, mothers and nurses ought to remove every thing which may tend to disturb their rest, and not to attend to every call for taking them up and giving food at improper periods. Infants cannot sleep too long; when they enjoy a calm, long-continued rest, it is a favorable symptom. Until the third year, children generally require a little sleep in the middle of the day, for, till that age, half their time may safely be allotted to sleep. Every succeeding year, the time ought to be shortened one hour; so that a child seven years old may sleep about ten hours. Children ought to rise at six o'clock in the summer, and at seven in the winter. It is extremely injudicious to awaken children with a noise, or to carry them immediately from a dark room into the glaring light, or against a dazzling wall: the sudden impression of light may debilitate the organs of vision, and lay the foundation of weak eyes.—Wet clothes or linen should never be allowed to be hung to dry in the bed-room, as an impure atmosphere is attended with various and often fatal consequences. 'Banish (says Professor Hufeland) feather beds, as they are unnatural and debilitating contrivances.' The bedstead should not be placed too low on the floor; and it is highly improper to suffer children to sleep on a couch which is made without a sufficient elevation from the ground."

EXERCISE. "The effort at exercise is both pleasant and serviceable to a child; and as it grows up, it is proper to regularly exercise it. Children who are perfectly healthy are in almost uninterrupted motion; but if exercise, either from its violence or too long duration, exceed the proper limits, it naturally quickens the circulation and respiration, which may occasion the rupture of small blood-vessels and inflammatory diseases. A weakly child ought not to be allowed to stand or walk long together; but should be alternately carried, drawn in a vehicle, and invited to walk. If a child seek to put its feet on the ground, let it do so; but do not force it to walk. In the first period of life, the exertion of crying is almost the only exercise of the infant; by which the circulation of the blood, and all the other fluids, are rendered more uniform; digestion, nutrition, and the growth of the body, are thereby promoted, and the different secretions of the skin (together with insensible perspiration) are duly performed. The loud complaints of infants deserve attention; for if their cries be violent and long con-

tinued, and they draw their legs towards the belly, it may safely be concluded, they are troubled with colic pains; and no time should be lost in yielding relief. To endeavor to prevent an infant from crying on every occasion, is to do it an irreparable injury; for, by such mismanagement, it never acquires a perfectly formed breast, and frequently the foundation is laid in the pectoral vessels for obstructions and other diseases. If children have been properly exposed to the air from infancy, they may, if healthy, be safely exercised in it in all seasons. The sooner infants are taken into the air, they become less subject to cold, convulsions, disordered bowels, and the rickets,—diseases so frequent among those who are reared in nurseries."

WASHING and BATHING. "The benefit to be derived from the daily practice of washing a child with cold water from head to foot, is almost incredible; it strengthens the nerves, maintains a sound and healthy state of the pores of the skin, and renders the surface of the body less susceptible of external impressions. In general a child may be begun to be washed in this manner in the third or fourth week, warm water being used till that period, which must be changed for cooler, until it be gradually reduced to cold. In frosty weather a little warm water may be added to the cold. It is highly imprudent to wash children directly after they rise from their bed, as the pores are then open; but, in about half an hour afterwards, if they be cool, they should be washed quickly. Avoid wetting the skin gradually; else the skin is not excited by the friction. After washing, rub the body until it be dry and warm. Delicate children should be washed in the evening, and placed in bed immediately afterwards.—In a striking manner does the cold bath preserve and promote the health of children; it refreshes and invigorates the organs of the skin, and considerably mitigates the diseases of measles and small pox. It is proper to begin the practice in warm weather, and to continue it through every season afterwards. Delicate and weakly children must be bathed in luke-warm water; but as they increase in strength, the degree of warmth may be diminished. For the first two or three months, the child should remain in the bath for a few moments only at a time; which as it grows older, may be gradually increased to a quarter of an hour. The body, while in the bath should be gently rubbed with the hand, or a piece of sponge, and the greatast care taken in rubbing it dry. If the shock of a cold bath appear too powerful for the constitution, bathing in salt and water may be substituted. If a child after bathing should feel disposed to sleep it may be indulged; and weakly children using the cold bath, may wear a flannel shirt. A child should not be bathed directly after eating; nor in cold weather, after coming out of the bath, exposed to the cold air.

TEETHING. This is an important and critical period of a child's life, and the danger generally increases in proportion to the delay of a child's getting its teeth. In general, children begin to cut their teeth between the fifth and eighth month. The symptoms attendant upon teething are well known; but many of the evils may be prevented by a strict attention to the bowels of the patient; for if the child be of a full habit of body, it is essential to have them in a lax state. If there be considerable fever, the gums may be scarified, and leeches applied behind the ears; but blisters have been used instead of leeches, with

considerable effect. With strong healthy children, the process of teething passes off without the least difficulty; but it is generally the contrary with those who are weak or unhealthy. The practice of giving a child a coral, or other hard substance into its hand, cannot be too severely reprobated; a crust of bread, or a piece of wax candle, will be found much better. Opium is sometimes given in order to allay the pain and irritation; but as it is attended with some danger, it ought to be prohibited from being used in the nursery, and a tea spoonful of syrup of poppies substituted; and this only in cases of urgency. To enable a child to pass easily through this dangerous period, every thing that has a tendency to promote general health, and prevent fever, should be resorted to; such as pure air, exercise, nutritious food, &c.

SUMMER COMPLAINT. This is a disease which is said to destroy nearly one fourth of all the children who die, in the Middle and Southern States. Its chief causes are, doubtless heated and impure air, and errors in regard to diet. Hence, as might be supposed, the disease is most prevalent in crowded cities, and among the poorer classes whose children are badly nursed, and especially neglected as to cleanliness of their persons and clothing.

One of the most effectual means therefore, of preserving children from an attack of this complaint, is to seek for them a healthy situation in the country, where they can enjoy the benefit of pure air. This, however, cannot always be effected—still much may be done by parents, who are confined with their families to the city, to prevent this disease. In such cases the children should occupy, always, the largest and most airy room in the house; if possible on the second floor. The room should be guarded from exposure to the direct rays of the sun, while a constant and free ventilation is kept up. The utmost cleanliness must also be observed in the room, as well as in the person and clothing of the children.

During the summer months, the daily use of the cold or tepid bath, while it ensures the cleanliness of the skin, is a very powerful means of preventing this disease. It should not, therefore, be neglected, provided there is no circumstance connected with the health and constitution of the child to forbid its employment.

In clear weather and in the cool of the day, children should be frequently carried abroad in the most open and healthy parts of the neighborhood; or, when the parents have it in their power, a considerable benefit will be derived from repeated rides in an open carriage, into the neighboring country.

WHOOPING COUGH. This is a disease distinguishable from all others by its shrill whoop, and which is terminated by vomiting; and is also indicated by a slight difficulty of breathing, hoarseness, &c.

In general, it is sufficient to guard the child from taking cold, and from eating to repletion. If the attack, however, be more than ordinarily severe, an emetic of ipecacuanha in the morning, and a gentle purgative during the day, will prove extremely serviceable. Small doses of elixir paragoric with ipecac or antimonial wine may be occasionally and beneficially administered. It is recommended, also, to give roasted apples, stoned prunes, &c., and frequently to bathe the feet in warm water. The vapor arising from a quantity of hot water, into which a

little vinegar or ether has been put, may be beneficially inhaled. A tea spoonful of equal portions of linseed oil and flour of sulphur is sometimes found useful. This quantity may be given to a child under four years of age. Vaccination is now often practiced as an effectual remedy for the whooping cough. Change of air is at all times important, and if practicable, the sea coast should be visited in severe cases. Flannel next the skin is very beneficial; a light diet should be used; and when the patient is in bed, his head and shoulders must be raised. Parents ought to pay the greatest attention, when the cough comes on, by bending the patient a little forward, which will be of great service, and guard against suffocation. Cold bathing has been attended with the most beneficial results.

CROUP. This is a disease generally confined to children, and which comes on imperceptibly and suddenly. The first indications of it, are a hoarse, dry cough and wheezing, which is followed by rattling in the throat. No time should be lost in obtaining *medical aid;* yet, while the physician is coming, something should be attempted. A distinguished physician recommends the giving of emetics of ipecac, and oxymel of squills between; the former as often as every two hours at least; warm bath often repeated; a blister put between the shoulder blades; calomel two grains, doses every two hours. For children above eight years old, the calomel may be increased to six, eight, and ten grains, according to the severity of the disease. A strong decoction of seneca (or snake) root, frequently taken into the mouth in small quantities, has been successfully used to promote a separation of the film and coagula that form and adhere to the windpipe, and cells of the lungs. The decoction is made by boiling an ounce of Seneca root in two pints of water down to a pint, and then straining. In all cases of croup, the child must be kept nearly upright in bed to guard against suffocation. If the child be threatened with suffocation, sneezing may be excited by introducing strong snuff up the nostrils, by means of a camel hair pencil.

MEASLES. This disease is contagious, and spreads widely by its effluvia. It commences, observes Dr. Clutterbuck, with symptoms of sneezing, red and watery eyes, and a short, dry, hoarse cough; which symptoms continue for some time after the eruption has disappeared. Frequently the inflammation extends to the substance of the lungs, giving rise to difficulty of breathing, with a pain in the chest, and a foundation is often laid for the pulmonary consumption. As the inflammation of the nose, eyes, and throat, declines with the other symptoms, it is of little consequence; and unless the habit or mode of treatment be bad, the disease seldom proves fatal. It differs much in different seasons; and its most frequent consequences are the various forms of scrofula, obstinate sores, and a weak and inflamed state of the eyes; the continuance of inflammation in the chest, in a chronic form, is another source of danger, which ought to be carefully guarded against. On the fourth day, small red pimples appear, first on the face, spreading over the whole body; the pimples hardly elevated above the surrounding skin, but by the touch, are found to be a little prominent. On the fifth or sixth day, they turn brown, and disappear with the peeling off of the scarf skin. Mild cases of measles require only careful nursing, and a free expecto-

ration by means of mild purgatives, diluting drinks, and a spare, low diet. Barley water, tamarind tea, and any thing of a simple nature should be taken freely; but fermented liquors, and every kind of animal food, must be avoided. All the drink should be tepid. When the measles suddenly disappear, every exertion must be made in order to restore the eruption. The patient must be placed in a warm bath, and warm wine and water, with ten drops of antimonial wine, frequently given. It may also be necessary to apply blisters to the inside of the thighs or legs, and to the throat. After the patient has recovered, it will be expedient to give two or three doses of cooling, opening medicines, and to cautiously avoid exposure to cold.

## SECTION II.

### POISONS.—SUSPENDED ANIMATION.

POISONS may be defined substances which prove fatal to the life of animals, whether taken by the mouth, mixed with the blood, or applied to the nerves by friction of the skin, or other means. Most of the substances called poisons are only so in certain doses; when given in smaller quantities, they are, many of them, active medicines. Others are fatal in the smallest quantities: such as those of *hydrophobia* and the *plague*.

As we cannot treat of poisons at large, we think our object will be best accomplished by the following tabular statements; the first column containing the *names* of the poisons; the second the *symptoms*, and the last the *remedies*. But we nevertheless advise, in every case where poisons have been taken, recourse to the best medical assistance at once.

| *Substances.* | *Symptoms.* | *Remedies.* |
|---|---|---|
| CONCENTRATED ACIDS. The vitriolic or sulphuric, nitric, muriatic, oxalic, &c. | Burning pain, vomiting; matter thrown up effervescing with chalk, salt of tartar, lime, or magnesia. | Calcined magnesia, one ounce to a pint of warm or cold water. A glass full to be taken every two minutes, so as to excite vomiting. Soap, or chalk and water, mucilaginous drinks afterwards, such as lintseed tea, or gum Arabic and water. |
| ALKALIES. Potash, Soda, Ammonia, Lime, &c. | Nearly the same; but ejected matter does not effervesce with alkalies, but acids. | Vinegar or lemon juice, a spoonful or two in a glass of water very frequently; simple warm water. |

POISONS.

| *Substances.* | *Symptoms.* | *Remedies.* |
| --- | --- | --- |
| MERCURIAL PREPARATIONS; Corrosive sublimate, &c. | Sense of constriction in the throat; matter vomited sometimes mixed with blood. | White of eggs; twelve or fifteen eggs beaten up, and mixed with a quart of cold water. A glassful every three minutes; milk, gum, water, linseed tea. |
| ARSENICAL PREPARATIONS: White arsenic, &c. | Extreme irritation, pain, sickness, and speedy death, if the poison be not soon counteracted. | Warm water with sugar, in large quantities, to excite vomiting. Lime-water, soap and water, pearlash and water, mucilaginous drinks. |
| PREPARATIONS of COPPER: Brass, verdigris, half-pence, &c, | Symptoms nearly the same as from mercury. | White of eggs; mucilaginous drinks. See MERCURIAL PREPARATIONS, above. |
| PREPARATONS of ANTIMONY: Emetic Tartar, &c. | Extreme sickness with other symptoms of poison, as above stated. | Warm water or sugar and water; afterwards grain of opium, or fifteen drops of laudanum every quarter of an hour, for two or three times. |
| NITRE, or SALTPETRE. | Obstinate vomiting; sometimes of blood, &c. | The same as for arsenic, with the exception of lime water and alkalies. |
| PHOSPHORUS. | Like mineral acids. | Like mineral acids |
| LEAD: Sugar of lead, Goulard's extract, &c. | Great pain in the stomach, with constriction of the throat, &c. | Large doses of Glauber's or Epsom salts, in warm water. |
| BARYTES. The carbonate, muriate, &c. | Vomiting, covulsions, palsy, pain in the stomach, &c. | Half an ounce of Epsom or Glauber's salts dissolved in a quart of water. Several glasses to be taken. In place of these salts large draughts of hard well water. |
| PRUSSIC ACID. | The most virulent poison, producing almost instant death, when applied even in small quantities to the surface of the body. | Emetics; afterwards oil of turpentine, ammonia, brandy, with warmth, friction and blisters. |
| SAL AMMONIAC. | Excessive vomitings, convulsions, pain in the bowels, alteration in the features: death. | Vomiting to be rendered easy by large draughts of warm sugar and water. If vomiting be not produced by the poison, it must be excited by the finger. Afterwards opiates. |

POISONS.

| *Substances.* | *Symptoms.* | *Remedies.* |
|---|---|---|
| GLASS or ENAMEL. | If taken in coarse powder, produces irritation and inflammation of the bowels. | Large quantities of crumb of bread should be eaten; afterward an emetic of white vitriol, and demulcent drinks. |
| ALCOHOL Brandy, rum, gin wine, &c. | Intoxication; when taken in large quantities, insensibility, apoplexy, or paralysis; countenance swoln, and of a dark red color; breathing difficult: often death. | A powerful emetic of white vitriol, or emetic tartar, vomiting to be encouraged by warm water and large clysters of salt water; bleeding; if the head be very hot, cold wet cloths may be applied; if the extremities be cold, friction. |
| IRRITATING VEGETABLE POISONS: Monks hood, meadow saffron, ipecacuanha, hellebore, bear's foot, savine, &c. | Acrid taste; excessive heat; violent vomiting; purging; great pain in the stomach and bowels. Externally applied, many of them produce inflammation, blisters, pustules | If vomiting be produced by the poison, large draughts of warm water, or thin gruel, to render it easier. If insensibility be present, white vitriol, or other active emetic: after the operation of which a brisk purgative; then a strong infusion of coffee or vinegar diluted with water. |
| NARCOTICS: Opium, henbane, hemlock, nightshade, &c. | Stupor; desire to vomit; heaviness in the head, dilated pupil of the eye; delirium; speedy death. | Pour 4 or 5 grains of emetic tartar in a glass of water. If this dose does not succeed, four grains of blue vitriol as an emetic. Do not give large quantities of water. *After* the poison has been ejected, give vinegar, lemon juice, or cream of tartar and strong coffee. |
| ACRID NARCOTICS: Mushrooms. | Nausea; heat; pain in the stomach and bowels; vomiting; purging; thirst; convulsions; cold sweats; death. | Three grains of emetic tartar in a glass of water; in fifteen minutes the dose to be repeated. After vomiting, frequent doses of Glauber's or Epsom salts, and stimulating clysters. |
| Nux vomica, St. Ignatius's bean, the upas, cocculus indicus, &c. | None of these inflame the parts they touch. Introduced into the stomach, or applied to wounds, they are rapidly absorbed, producing generally rigidity, convulsions, and death. | The emetic as under MUSHROOMS: lungs to be inflated. Two ounces of water, one drachm of ether, two drachms of oil of turpentine, and half an ounce of sugar, mixed together: two spoonsful of which to be taken every ten minutes. |

POISONS.

| Substances. | Symptoms. | Remedies. |
|---|---|---|
| **POISONOUS FISH.** Oldwife, lobster, crab, dolphin, conger eel, muscle, &c. | In an hour or two, or sooner, after some fish have been eaten, more especially if stale, weight at the stomach, sickness, giddiness, thirst, &c. come on: in some cases, death. | An emetic; vomiting to be excited by tickling the throat with the finger, and by draughts of warm water. After vomiting, an active purgative; afterwards, vinegar and water, or water sweetened with sugar, and an addition of ether. After the evacuations, laudanum. |
| **POISONOUS SERPENTS.** The viper, or adder, rattle snake, &c. | A sharp pain in the wounded part, soon extending over the body; great swelling, first hard and pale, then reddish; faintings, vomitings, convulsions, inflammation, often extensive suppuration, gangrene, and death. | A moderately tight ligature to be applied above the bite, and the wound left to bleed, after being washed with warm water. The actual cautery, lunar caustic, or butter of antimony, to be applied: the lint dipped in equal parts of olive oil and spirit of hartshorn. Ligature to be removed if the inflammation be considerable. Warm, diluting drinks, with small doses of ammonia or hartshorn, to cause perspiration. The patient should be well covered in bed, drinking occasionally warm wine. If gangrene threaten, wine and bark must be freely given. |
| **SPANISH FLIES.** | Nauseous odor of the breath, burning heat in the throat and stomach, vomiting — often bloody, painful priapism, heat in the bladder, convulsions, delirium, death. | Vomiting freely excited by sweet oil, sugar and water, or lintseed tea; emollient clysters. Camphor dissolved in oil, may be rubbed over the belly and thighs. |
| **VENOMOUS INSECTS.** Tarantula, scorpion, hornet, wasp, bee, gnat, &c. | In general only a slight degree of pain and swelling; sometimes sickness and fever. | Hartshorn and oil, salt and water. A few drops of hartshorn may be taken internally, in a glass of water. The sting may in general be removed by making a strong pressure over it with the barrel of a small watch key. |

In many cases of poisoning, emetics are necessary, in order to remove the poison from the stomach. It has, however, been proved that a late invention,

The STOMACH PUMP, is much more expeditiously effectual than emetics, and is now very often resorted to by medical practitioners for such purposes; but the use of this instrument can scarcely be confided to inexperienced hands.

POISON *from the inhalation of, or being immersed in noxious gas.* Whenever persons are found in a state of apparent death from being

immersed in, or having inhaled noxious gas, whether from the fumes of burning charcoal, the exhalations of lime-kilns, the gas from fermentations, the choak-damp of mines, the gas from wells, or the gas in the lower parts of caverns, the following method must be pursued for their recovery.

Expose the patient to atmospheric air without any fear of the cold; remove all his clothes and place him upon his back, with the head and breast somewhat elevated so as to promote respiration. On no account administer tobacco fumigations, or place the sufferer in a warm bed. Give a few glasses of lemon-juice and water, or vinegar weakened by the addition of three parts water; sprinkle the body, particularly the face and breast, with cold vinegar; after this rub the body with cloths steeped in vinegar, camphorated spirits of wine, or any other spirituous fluid; at the end of two or three minutes wipe the parts which have been wetted, with a warm towel, and after the interval of two or three minutes, recommence the sprinkling and rubbing with cold vinegar and spirits. These means must be persevered in for some time. Irritate the soles of the feet, and palms of the hands, and the whole course of the back with a brush; administer a clyster consisting of one part vinegar and two parts water; after a few minutes administer another prepared with two ounces of common salt, and one ounce of Epsom salts dissolved in water. Irritate the nostrils by a little roll of paper or a feather; or burning matches, or volatile alkali, taking care that the phial containing this last article be not held long at the nose. The lungs should also be inflated. All these methods failing, the patient should be bled in the foot if the face continue red, the lips swoln, and the eyes as it were starting from their sockets. Emetics should be avoided, except where persons recovering are troubled with excessive nausea; when the patient is restored to his senses, he may be put into a warm bed in an apartment having all the windows open. He may then take a few spoonsful of some good wine, as Sherry, or Madeira; the wine may be warmed and sugar added. It has often happened that five or six hours have elapsed before persons have been restored.

A well attested account has recently been published, of the speedy recovery of a person who had become insensible by reason of noxious vapor, at the bottom of a well, by means of *cold water* dashed from above on his head.

DROWNING is the act of suffocating or being suffocated, by a total immersion in water. The length of time during which a person may remain in this element, without being drowned, is very unequal in different individuals, and depends as much on the temperature of the water as on the particular constitution of the subject; in general, however, there is less prospect of recovery, after having continued fifteen minutes in a watery grave. In such cases, death ensues from impeded respiration, and the consequent ceasing of the circulation of the blood, by which the body loses its heat, and with that the activity of the vital principle. Dr. Goodwyn justly observes, that the water produces all the changes which take place in drowning, only *indirectly*, by excluding the atmospheric air from the lungs, as they admit but

a very inconsiderable quantity of fluid to pass into them during immersion. Hence we find, that inflation of the lungs is one of the principal means of restoring life.

Previous to any *active* measures being taken for recovering drowned persons, the following circumstances ought to be duly weighed by those engaged in this humane office:—1. The season and weather. 2. Length of time the person has continued under water. 3. The state of his mind when the accident happened; whether he was intoxicated, frightened, &c. 4. Constitution of the body, and whether he was in a state of perspiration. 5. The height from which he fell, and whether his head plunged foremost. 6. Depth of the water; whether it was cold or warm, sea or river water, and how he was dressed. Lastly, 7. The manner in which he was taken out, whether by the legs, and without receiving any injury, or by instruments; and whether he was rolled about in a tub, or what other methods were pursued for his restoration.

Few improvements appear to have been made in the treatment of the drowned, since this important branch of medical science was first discussed. We shall briefly state the principal rules of conduct to be observed, with respect to persons in that deplorable situation.

Symptoms of Apparent Death by Drowning.—Coldness; paleness of the whole body; the lips of a livid hue; the mouth either open or firmly closed; the tongue blue, swelled and protruded; the eye-lids closed, the eyes turned, and their pupils dilated; the face swelled and blue; the lower belly hard and inflated. The first signs of returning animation are, convulsive starting of the muscles of the face, or feet; motion of the eyelids; a spasmodic shivering of the body.

Treatment.—1. After having been carefully taken out of the water by the arms, so as to prevent the least injury to the head and breast, the body ought to be carried to the nearest house, in a bier, if possible, with the head somewhat raised; or, in fine warm weather, the resuscitative process may with more advantage be performed in the open air, especially in sun-shine.

2. When the subject is deposited, the upper part of the body should be supported half sitting, with the head inclining towards the right side.

3. The clothes are to be taken off without delay, but with the greatest precaution; as violent shaking of the body might extinguish the latent spark of life.

4. The mouth and nose must be cleansed from the mucus and froth, by means of a feather dipped in oil.

5. The whole body should now be gently wiped and dried with warm flannel cloths, then covered with blankets, feather-beds, hay, straw, &c. In cold or moist weather, the patient is to be laid on a mattrass, or bed, at a proper distance from the fire, or in a room moderately heated; but in the warm days of summer, a simple couch is sufficient.

6. If the patient be very young, or a child, it may be placed in bed between two persons, to promote natural warmth.

7. In situations where the bath cannot be conveniently procured,

bladders filled with lukewarm water should be applied to different parts of the body, particularly to the pit of the stomach; or a warming-pan wrapped in flannel, gently moved along the spine; or aromatic fomentations frequently and cautiously repeated.

8. As the breathing of many persons in an apartment would render the air mephitic, and thus retard, or even prevent the restoration of life, not more than five or six assistants should be suffered to remain in the room where the body is deposited.

STIMULANTS GENERALLY EMPLOYED. 1. Moderate friction with soft warm flannel at the beginning, and gradually increased by means of brushes dipped in oil till pulsations of the heart are perceptible.

2. Inflation of the lungs, which may be more conveniently effected by blowing into one of the nostrils, than by introducing air into the mouth. For the former purpose, it is necessary to be provided with a wooden pipe, fitted at one extremity for filling the nostril, and at the other, for being blown into by a healthy person's mouth, or for receiving the muzzle of a pair of common bellows, by which the operation may be longer continued. At first, however, it will always be more proper to introduce the warm breath from the lungs of a living person, than to commence with cold atmospheric air. During this operation, the other nostril and the mouth should be closed by an assistant, while a third person gently presses the chest with his hands as soon as the lungs are observed to be inflated.

3. Stimulating clysters, consisting of warm water and common salt or a strong solution of tartar emetic, or decoctions of aromatic herbs, or six ounces of brandy, should be speedily administered. We do not consider injections of the smoke of tobacco, or even clysters of that narcotic plant, in all instances safe or proper.

4. Let the body be gently rubbed with common salt, or with flannels dipped in spirits; the pit of the stomach fomented with hot brandy, the temples stimulated with spirits of hartshorn, and the nostrils occasionally tickled with a feather.

5. Persons of a very robust frame, and whose skin after being dried assumes a rigid and contracted surface, may be put into a sub-tepid bath of about 65° which must be gradually raised to 75° or 80° of Fahrenheit's scale, according to circumstances; or the body carried to a brewhouse, and covered with warm grains for three or four hours; but these expedients generally require medical assistance.

6. Violent shaking and agitation of the body by the legs and arms though strongly recommended, and supposed to have often forwarded the recovery of children and boys, appears to us a doubtful remedy, which can be practised only in certain cases.

7. Sprinkling the naked body of a drowned person with cold water; submitting it to the operation of a shower bath, or the sudden shocks of the electric fluid; as well as whipping it with nettles, administering emetics, and blood-letting, are desperate expedients, which should be resorted to only after the more lenient means have been unsuccessfully employed.

It is, however, a vulgar and dangerous error to suppose that persons apparently dead by immersion under water are irrecoverable, because

life does not soon re-appear; hence we seriously intreat those who are thus employed in the service of humanity to persevere for three or four hours at least in the application of the most appropriate remedies above described; for there are many instances recorded of patients who recovered after they had been relinquished by all their medical and other assistants.

TREATMENT ON THE RETURN OF LIFE. As soon as the first symptoms of that happy change become discernible, additional care must be taken to cherish the vital action by the most soothing means. All violent proceedings should, therefore, be immediately abandoned, no farther stimulants applied, nor even the ears of the patient be annoyed by loud speaking, shouting, &c. At that important crisis, moderate friction only is requisite. And, if the reviving person happen to be in the bath, he may either remain there, provided his sensations be easy and agreeable, or be removed to a comfortable bed, after being expeditiously dried with warm flannels; fomentations of aromatic plants may then be applied to the pit of the stomach; bladders filled with warm water, placed to the left side; the soles of the feet rubbed with salt; the mouth cleared of froth and mucus, and a little white wine, or a solution of salt in water, dropped on the tongue. But all strong stimulants, such as powerful electric shocks, strong odors of volatile salts, &c. are at this period particularly injurious. Lastly, the patient, after resuscitation, ought to be for a short interval resigned to the efforts of nature, and left in a composed and quiescent state: as soon as he is able to swallow, without compulsion or persuasion, warm wine, or tea, with a few drops of vinegar, instead of milk or gruel, warm beer, and the like, should be given in small quantities frequently repeated.

CHOKING. As soon as any person is observed to be choked, and more particularly children, the obstructing body should be felt for with a finger at the top of the throat; it is possible many times to remove it directly, and should we fail in this, the puking excited by the finger frequently removes the offending body.

Food, and foreign substances are sometimes lodged in the top of the wind pipe, and produce immediate suffocation; help in this case must be afforded at the moment, by introducing the finger. Sometimes, however, a bunch of thread with several small nooses, secured upon the end of a piece of whalebone, will frequently be serviceable, in removing sharp pointed bodies, as fishbones, needles, &c. Should this fail, a piece of sponge may be fastened to the whalebone, and passed into the stomach, and when it becomes enlarged by moisture, it most frequently brings away any foreign substance which may be present: the enlargement of the sponge may be forwarded by the patient swallowing a little water. Vomiting will sometimes succeed; though this should not be attempted when the substance is sharp and pointed.

Unless the offending body can be seen, any apparatus is unsafe except in the hands of an experienced surgeon.

Presence of mind will enable any person to do much, in all cases of casualty, and particularly in this, and the directions above are sufficient. The finger, and the vomiting it is sure to produce, will do much more at the instant than is commonly thought.

LIGHTNING. Persons apparently dead from lightning may be frequently restored by proper means. Sprinkling or affusion of cold water, and in general the means laid down for aerial poisons, are to be persevered in. A rigidity of the limbs usually attends persons recovering from a stroke of lightning; sprinkling, and rubbing the parts with cold water should often be used.

The means to be used for the recovering of persons suddenly deprived of life, are nearly the same in all cases. They are practicable by every one who happens to be present at the accident, and require no great expense, and less skill.

The great aim is to preserve or restore the vital warmth and motion. This may in general be attempted by heat, frictions, blowing air into the lungs, administering clysters, cordials, &c. These must be varied according to circumstances. Common sense, and the situation of the patient, will suggest the means of relief. Above all, we would recommend *perseverance*. Much good may, and no harm can result; who would grudge pains in such a case?

## SECTION III.

### FAMILY DISPENSATORY.

Every family should know something about the weights and measures which are used by apothecaries, and the signs by which they are denoted.

#### WEIGHTS.

| | | | |
|---|---|---|---|
| The pound | - ℔ | contains | twelve ounces, |
| – ounce | - ℥ | - | eight drachms, |
| – drachm | - ʒ | - | three scruples, |
| – scruple | - ℈ | - | twenty grains. |
| – grain | - gr | - | |

The grain weights are stamped with punch marks, indicative of the number of grains each, is equivalent to.

#### MEASURE OF FLUIDS.

| | | | |
|---|---|---|---|
| The gallon | - cong. | contains | eight pints. |
| – pint | - (octavus,) | - | sixteen fluid drachms. |
| – fluid ounce | f ℥ | - | eight fluid drachms. |
| – fluid drachm | f ʒ | - | sixty minims. |
| – minim or drop | ♏ | | |

A table spoonful is supposed to be equal to half an ounce, or four drachms—yet many of the modern spoons will contain five drachms. A tea spoonful will equal sixty or seventy drops. A drop will contain a quantity proportioned to the size of the mouth of the vial from which it falls. A common ounce vial should be a medium size.

Where the dose furnished for an adult is a certain quantity, the proper dose for a person of fourteen years will be two thirds of that

quantity—for seven years, one half—for five years, one third—for three years, one fourth—for twenty-eight months, one fifth—for fourteen months, one eighth—for seven months, one twelfth—for two months, one fifteenth—for one month, one twentieth—under, one twenty-fourth.

It is recommended that laudanum, antimonial wine, and other active fluids, should not be given to young children, after there is a *cloud* in them, as the strength is then uncertain. In such cases, the substance having fallen to the bottom, the top of the fluid is weaker, and the bottom stronger.

Laxative Pills. Take of powder of cinnamon, 10 grains; socotorine aloes in fine powder, and castile soap, of each one drachm. Beat them together in a stone or iron mortar, adding one or two drops of sirup or molasses. Make into 32 pills. Dose for grown persons, two at bed time.

Pills of Aloes and Fetida. Take socotorine aloes, assafœtida, and soap, equal parts. Pill with gum arabic. These pills are good in indigestion, attended with costiveness, and wind in the stomach and bowels.

Hull's Colic Pills. Take cinnamon, cloves, mace, myrrh, saffron, ginger, castile soap, of each one drachm, socotorine aloes one ounce, essence of peppermint sufficient to moisten it. Make common sized pills and take them till they operate.

Purging Pills. Take rhubarb one part, cream tartar three parts, grind together, and take a tea-spoonful in molasses occasionally, to prevent costiveness.

Sir H. Halford's Aperient Pills. Take of blue pill, twenty grains; compound extract of colocynth, half a drachm; mix, and divide into twelve pills. One or two to be taken for a dose, every second or third night.

Strengthening Pills. Take of subcarbonate of iron, two drachms; ipecacuhana, in powder, one scruple; extract of gentian, two scruples; socotorine aloes, powdered, eight grains; simple sirup or mucilage, enough to form a mass; divide into forty pills. Take two or three twice or thrice a day.

To Excite Perspiration. Take of opium, six grains; camphor, twelve grains; James' powder, twelve grains; conserve enough to form into twelve pills. One to be taken at bed time, occasionally.

Adhesive Plaster. Take of yellow resin, half a pound; lead plaster, three pounds; melt the lead plaster by a gentle heat, then add the resin in powder, and mix. This is the plaster commonly applied to cuts, and to hold together the edges of recent wounds.

Anodyne Plaster. Take of hard opium, powdered, half an ounce; resin of spruce fir, powdered, three ounces; lead plaster, a pound; melt the plaster and resin together, and then add the opium and mix.

Strengthening Plaster. Take of litharge plaster, four ounces; white resin, one ounce; yellow wax, olive oil, of each, half an ounce;

rub the iron with the oil, and adding the other ingredients, mix the whole.

PICRA. Socotorine aloes, one pound; white canella, three ounces; separately powdered and then mixed. Good purgative. Doses, between a scruple and a drachm. May be taken in sirup or molasses.

SWEATING POWDER, OR DOVER'S POWDER. Ipecac in powder; opium, (dry,) of each, one part; sulphate of potash, eight parts; grind them together to a fine powder. Dose from five to twenty grains, as the stomach and strength will bear it; lessen the dose if it threatens to puke. This is a powerful sweating remedy in fevers, rheumatisms, and dropsy, excellent in colds and suppressed respiration. In general, this is the best opiate, as the ipecac lessens the danger of a habitual use of opium—a thing to be avoided next to the habits of intoxication.

ELIXIR PROPRIETATUS, ELIX. PRO., OR TINCTURE OF MYRRH AND ALOES. Take of myrrh in powder, two ounces; alcohol, one pound and a half; water, half a pound; mix the alcohol with the water and add the myrrh. Steep four days, and then add socotorine aloes, an ounce and a half; saffron, an ounce. Steep three days, and pour off the clear liquor from the sediment. Laxative and stomachic.

TINCTURE OF BARK, OR HUXHAM'S TINCTURE. Take of Peruvian bark in powder, two ounces; orange peel, dried, half an ounce; Virginia snake root, bruised, three drachms; saffron, one drachm; proof spirits (rum,) two pounds; steep fourteen days and strain. Good preparation of the bark, taken as a bitter, a tea spoonful to a glass of wine before eating; useful in low fevers.

TINCTURE OF GUAIAC. Take of gum guaiac, one pound; alcohol, two pounds and a half; steep for seven days and strain. Powerful sweating remedy in rheumatism and old gouty affections. Dose, a tea spoonful in spirit.

LAUDANUM. Take of opium, two ounces; diluted alcohol, two pounds; digest seven days. This is an elegant opiate, but separates by keeping.

ELIXIR ASTHMATIC. Take liquorice root, (pounded pretty fine,) one pound; common honey, one pound; Benzoic acid, or flowers, half an ounce; gum opium, (good,) half an ounce; gum camphor, a third of an ounce; oil of annise, two drachms; common pearlash, half an ounce: best old spirits, eight pints. To the liquorice, pounded pretty fine, add the other ingredients, taking care to pulverize the *opium*. When prepared, it should be kept in a warm place ten or twelve days, and decanted clear. The remaining liquor must be squeezed from the roots, and filtered through a piece of unsized paper.

LINSEED MEAL POULTICE. Scald your basin by pouring a little hot water into it; then put a small quantity of finely ground linseed meal into the basin, pour a little hot water on it, and stir it round briskly until you have well incorporated it; add a little more meal and a little more water, then stir it again. Do not let any lumps remain in the basin, but stir the poultice well, and do not be sparing of your trouble.

BREAD AND WATER POULTICE. Put half a pint of hot water into a pint

basin, add to this as much of the crumbs of bread as the water will cover, then place a plate over the basin, and let it remain about ten minutes; stir the bread about in the water, or if necessary, chop it a little with the edge of the knife, and drain off the water by holding the knife on the top of the basin; but do not press the bread as is usually done; then take it out lightly, and spread it about one third of an inch on some soft linen, and lay it upon the part. If the part to which it is applied, be a wound, a bit of lint dipped in oil may be placed beneath the poultice. "This poultice," says Mr. Abernethy, "may be made with poppy water, if thought necessary; it may be made with hemlock juice, if recently expressed, which is a very good application to irritable sores; but there is nothing better, that I know of, than the bread poultice to broken surfaces."

Mustard Poultice. Take of mustard seed, and linseed, of each, (in powder,) half a pound; hot vinegar a sufficient quantity; mix them to the consistency of a poultice, and the poultice will be fit for use.

Yeast Poultice. Take of flour, a pound; yeast of beer, half a pint; mix, and expose the mixture to a gentle heat, until it begins to swell, when it is fit for use.

Simple Ointment. Take olive (sweet) oil, five parts; white wax, two parts; melt together. May be used for softening the skin, and healing chaps and excoriations.

Golden Ointment. Take of purified quicksilver, an ounce; nitric acid, eleven drops; lard, six ounces; olive oil, four ounces; dissolve the mercury in the acid, then mix the hot solution, with the oil and lard melted together. This is an excellent ointment for sore eyes, scald head, and most sorts of ulcers. When first used, it should be mixed with an equal quantity of simple ointment.

Sulphur Ointment. Take of hog's lard, four parts; flowers of sulphur, one part; to each pound of this ointment may be added, volatile oil of lemons, or oil of lavender, half a drachm. A certain remedy for the cure of itch. A pound serves for four unctions. The patient should be rubbed four nights in succession, each time one fourth part of the body.

Sir H. Halford's Pile Ointment. Take one ounce of golden ointment, and the same quantity of almond oil; mix them carefully in a mortar. Apply this ointment to the part affected once or twice daily.

Yellow Basilicum Ointment. Take of yellow wax, white resin, and frankincense, of each one quarter of a pound; mix, and melt over a gentle fire, then add lard, one pound; strain the ointment while warm. This ointment is the best dressing for all heathy ulcers.

Simple Sirup. Take of double refined sugar, fifteen parts; water, eight parts. Let the sugar be dissolved by a gentle heat, and boiled a litttle, so as to form a sirup.

Sirup of Ginger. Take of best ginger, three ounces; boiling water, four pounds; double refined sugar, seven and a half pounds; steep the ginger in the water, in a close vessel, for twenty-four hours, then

to the strained liquor add the best sugar, so as to make a sirup. This is is an agreeable and moderately aromatic sirup; impregnated with the flavor and the virtues of the ginger.

Sirup of Lemon. Take of juice of lemons, suffered to stand till the sediment falls, then strain off the liquor, three parts; double refined sugar, five parts; dissolve the sugar in the juice till it forms a sirup. In the same way are prepared sirup of mulberry juice, sirup of raspberry juice, and sirup of black currant juice. All these are pleasant cooling sirups; quenching thirst; and may be used in gargles for sore mouths.

Volatile Liniment. Take spirit of hartshorn, one part; sweet oil, or fresh butter, two parts; mix and shake in a vial. Sometimes a little laudanum or camphor is added.

Liniment of Oil and Lime. Take of linseed oil, lime water of each equal parts; mix them. This liniment is extremely useful in burns and scalds; efficacious in preventing inflammation after such accidents.

Camphorated Oil. Take of olive oil, two ounces; camphor, half an ounce; dissolve the camphor in the oil. Good, applied to local pains; to glandular swellings, and to the bowels in tympany.

Opodeldoc. Take of the best hard soap, two ounces; camphor, one ounce; very strong spirit, one pint; mix the soap with the spirit, and let them stand in a moderate heat, until the soap is dissolved, occasionally shaking the vial; then add the camphor, and continue to shake the vessel frequently until the whole is dissolved. Useful in sprains, bruises, and rheumatic pains. Good to disperse swellings, tumors and the like.

# PART IV.

## MANUFACTURES.

COTTON. The rearing of cotton and the manufacture of it into various fabrics, have of late years become objects of so much attention, in several parts of the world, that we shall devote the greater space to a notice of these two subjects, than our limits would otherwise seem to justify.

The plant which produces cotton is cultivated in the East and West Indies, in North and South America, of which it is a native, and in Egypt and other parts of the world. It is an annual plant, propagated from seeds. It grows to a considerable height, and has leaves of a bright green color marked with brownish veins, and each divided into five lobes. The pods which contain the cotton, are triangular in shape, and have each three cells. These, on becoming ripe burst, and disclose their snow white contents.

The cotton which is cultivated in the southern parts of the United States is of *three* kinds—the *nankeen* cotton so called from its color; the *green seed* cotton, producing white cotton and green seeds; and

the *black seed* cotton. The two first kinds are cultivated in the middle and upper country, where they go by the name of *short staple* cotton; the last is raised in the lower country near the sea, and on the islands adjacent to the continent. This is denominated *sea island* cotton; it is stronger, finer, and longer than the short staple cotton, and bears a higher price in market.

The *manner of raising cotton*, upon which it will be proper to make a few observations, is as follows:—

If the land has been recently cleared, or has long remained fallow, turn it up deep in winter; and in the first week in March, bed it up in the following manner. Form 25 beds in 105 square feet of land (being the space allotted to each able laborer for a day's work); this leaves about four feet two and one-half inches from the centre of one bed to the centre of the next. The beds should be three feet wide, and flat in the middle. About the 15th of March, in the latitude of from 29° to 30°, the cultivator should commence sowing, or as it is generally termed, planting. The seed should be well scattered in open trenches, made in the centre of the beds and covered; the proportion of seed is one bushel to an acre; this allows for accidents occasioned by worms, or night chills. The cotton should be well weeded by hoes once every twelve days, until blown, and even longer, if there is grass, observing to hoe up, that is, *to* the cotton, till it pods; and hoe down, when the cotton is blown, in order to check the growth of the plant. From the proportion of seed mentioned, the cotton plants will come up plentifully, too much so, to suffer all to remain. They should be thinned moderately at each hoeing. When the plants have got strength and growth, which may be about the third hoeing, to disregard worms, and bear drought, they should be thinned according to the fertility of the soil, from six inches to near two feet between the stocks or plants. In rich river grounds, the beds should be from five to six feet apart, measuring from centre to centre; and the cotton plants, when out of the way of worms, from two to three feet apart. It is advisable to top cotton once or twice in rich low grounds, and also to remove the suckers. The latter end of July is generally considered a proper time for topping.

The month of August in South Carolina and Georgia, is the season for commencing the business of picking cotton.

The quantity of black seed cotton produced by an acre of Georgia sea island, is about 200 lbs.; in Carolina, from 130 to 150 lbs.; an acre of upland will commonly produce 300 lbs. of green seed cotton.

The preparation of the ground for cotton is almost entirely effected by the hoe. The plough is scarcely used.

For many years, *separation of the seeds* was a work of great labor. But this is now much diminished by means of *gins*, of which there are two kinds—the *roller-gin* and the *saw-gin*.

The *first* of these gins, consist of two small cylinders, which revolve so closely, that while the cotton passes through, the seeds are prevented.

The second kind, or saw-gin, was the invention of Mr. Whitney, of New-Haven, Connecticut, and is one of the most important labor-saving machines ever introduced into the country. It is used in disenga-

ging the seeds of the black seeded cotton, which adhere too strongly to be separated by the roller-gin. This machine consists of a receiver, one side of which is covered with strong parallel wires, about an eighth of an inch apart. Between these wires pass a number of circular saws, revolving on a common axis. In a revolution of these saws, the cotton becomes entangled, and is drawn through the grating, while the seeds are, from their size, denied a passage.

The earliest seat of the manufacture of cotton was Hindoostan, where it is still carried on, as at the first, by hand labor. But by means of the inventions of Hargreaves and Arkwright, between the years of 1768 and 1780, the manufacture of cotton has so far outstripped that of the East, that the countries of the latter are now receiving the products of British manufactories at a cheaper rate than they can manufacture for themselves. Cotton fabrics are also beginning to be exported from the United States to the East to advantage.

Next to the facilities for preparing cotton for the loom, which have arrived to an astonishing degree of perfection, nothing has contributed to extend the manufacture more than the invention of the *power-loom*, by which the laborious process of weaving is converted into the mere superintendance of two and sometimes three of these machines, each one of which is capable of producing from thirty to forty yards of cloth per day. Added to this, is the discovery of a process for transferring in the manufacture of calicoes, the most delicate patterns from copper cylinders, instead of from wooden blocks; by means of which the labor and expense are surprisingly diminished.

We shall next speak of the process observed in the manufacturing of cotton into cloth, which we abridge from the Encyclopedia Americana.

"After the cotton has been ginned and picked or batted, the first operation of the manufacturing, is *carding*. The *carding engine* consists of a revolving cylinder covered with cards, which is nearly surrounded by a fixed concave framing, also lined with cards, with which the cylinder comes in contact. From this cylinder, called the *breaker*, the cotton is taken off by a comb called the *doffing*-plate, and passes through a second carding in the *finishing* cylinder. It is then passed through a kind of funnel, by which it is contracted into a narrow band or sliver, and received into tin cans, in a state of uniform, continued carding. The next step in the process, is called *drawing* the cotton. This is effected by the *drawing-frame*, which in principle is similar to the *spinning-frame*. *Roving* the cotton, which is the next part of the process, gives a slight twist, which converts it into a soft and loose thread, called the *roving*. The machine for performing this operation is called the roving-frame, or *double*-speeder. In order to wind the roving upon the bobbins of the spindles, in even, cylindrical layers, the spindle rail is made to rise and fall slowly by means of heart-wheels in the interior of the machine. And as the size of the bobbin is augmented by each layer, the velocity of the spindles and of the spindle-rail is made to diminish gradually, from the beginning to the end of the operation. This is effected by transmitting the motion to both, through two opposite cones, one of which drives the other with a band, which is made to pass

slowly from one end to the other of the cones, and thus continually to alter their relative speed, and cause a uniform retardation of the velocity. The bobbins are now transferred to the spinning frame. The twist is given to the thread when drawn out by flyers driven by bands, which receive their motion from a horizontal fly-wheel. The yarn produced by this mode of operation is called *water twist*, from the circumstance that the machinery from which it is obtained was at first generally put in motion by water. In 1775, the mule jenny, or mule, was invented by Samuel Crompton, of Bolton. The spindles are mounted on a moveable carriage, which recedes when the threads are stretched, and returns when they are to be wound up. By means of this machine, the size and twist of the thread become uniform throughout.

The following process of a pound of cotton, may not be uninteresting to our readers. It appeared originally in the English Monthly Magazine. "There was sent to London lately, from Paisley, a small piece of muslin, about one pound weight, the history of which is as follows:—The wool came from the East Indies to London; from London it went to Manchester, where it was manufactured into yarn; from Manchester, it was sent to Paisley, where it was woven. It was sent to Ayrshire next, where it was tamboured; it was then conveyed to Dunbarton, where it was hand-sewed, and again returned to Paisley, whence it was sent to Glasgow and finished, and then sent per coach to London. It took three years to bring this article to market, from the time that it was packed in India, till it arrived complete in the merchant's warehouse in London; whither it must have been conveyed 10,000 miles by sea, and nearly 1000 by land, and contributed to reward the labors of nearly 150 persons, whose services were necessary in the carriage and manufacture of this small quantity of cotton, and by which its value was advanced more than 2000 per cent."

SILK MANUFACTURE. Silk is a very soft, fine, bright, delicate thread, the production of an insect or moth, called by the ancients *bombyx;* by the moderns, *phalæna mori*, or *silk worm*. Silk is manufactured into a variety of fabrics, of which we shall notice the following:

SATIN is a kind of thick silken stuff, very smooth and shining; the warp is very fine and prominent, the woof coarser, and hidden underneath; on which depends its gloss and beauty. Some satins are quite plain, others wrought, some flowered with gold or silk, others striped. The finest satins are those of Florence and Genoa, yet the French will not allow those of Lyons to be at all inferior. Indian satins, or satins of China, are silken stuffs much like those manufactured in Europe. Of these, some are plain, others worked either with gold or silk, flowered, damasked, striped, &c. They are mostly valued because of their bleaching easily, without losing any thing of their lustre. In other respects, they are inferior to those of Europe. Some very good satins are made in England.

VELVET, a rich kind of thick, shaggy stuff, made of silk; the nap, or velveting of this stuff is formed of a part of the threads of the warp, which the workman puts on a long, narrow, channelled ruler, and which he afterwards cuts by drawing a sharp steel tool along the ruler, to the end of the warp. The principal, and best manufactures of velvet, are

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in England and France; there are others in Italy, as at Venice, Milan, Florence, Genoa, and Lucca, and in Holland at Haerlem; those in China are the worst of all. A good imitation of silk velvet is now to be obtained, made of cotton; but the dyes are less permanent on cotton than on silk.

TAFFETY; a kind of fine, smooth, silken stuff, having usually a remarkable gloss. There are taffeties of all colors, some plain, others striped with gold, silver, silk, &c., others chequered or flowered. There are three things that contribute to the perfection of taffeties, the silk, the water, and the fire. The silk should not only be of the finest kind, but must be worked a long time, and very much before it is used. The watering seems only intended to give it that fine lustre by a peculiar property, not found in all waters; and lastly, the perfection of the stuff depends greatly on a particular application of the fire.

GAUZE; a transparent kind of stuff, which is woven sometimes of silk, and at other times only of flax. There are figured gauzes, some with flowers of gold and silver, on a silk ground; these last are chiefly brought from China. The gauze loom is much like that of a common weaver's, though it has several appendages peculiar to itself.

TABBY; in commerce, a kind of coarse taffety, watered. It is manufactured like the common taffety, excepting that it is stronger and thicker, both in the woof and warp. The watering is given to it by means of a calender; the rollers are of iron or copper, variously engraven, which bearing unequally on the stuff, render the surface thereof unequal, so as to reflect the rays of light differently. It is usual to tabby mohairs, ribbons, &c. Tabbying is performed without the addition of any water or dye, and furnishes the modern philosophers with a strong proof that colors are only appearances.

BROCADE; in commerce, a sort of stuff made of cloth, of gold, silver, or silk, raised and enriched with flowers, foliage, or other figures, according to the fancy of the manufacturer. Formerly, the term was applied only to cloths woven either wholly of gold, both woof and warp, or of silver, or both together; but by degrees, it came likewise to pass for such as had silk intermixed, to fill up and terminate the flowers of gold and silver. At present, any stuff or silk, satin, or even simple tapestry, when wrought and enriched, with raised flowers, &c., obtains the appellation of brocade.

STOCKINGS. Anciently, the only stockings in use were made of cloth, or milled stuffs sewed together; but since the invention of knitting and weaving stockings of silk, wool, and cotton thread, the use of cloth stockings is laid aside. The modern stockings, whether woven or knit, are a kind of plexus, formed of an infinite number of little knots, called stiches, loops, or meshes, intermixed. Knit stockings are wrought with needles, made of polished iron or brass wire, which interweaves the threads, and form the meshes of which the stocking consists. This operation is called knitting, the time of the invention of which it is difficult to fix precisely, though it is commonly attributed to the Scots, because the first works of this kind came from Scotland. Woven stockings are manufactured on a frame or machine made of

iron, the structure of which is exceedingly ingenious, yet complex. On this account, it is not easily described.

HISTORY OF SILK. The silk worm is a native of China. The Seres, who inhabit the northern part of that country, cultivated the precious article. Having been expelled by the Huns, A. D. 93, they settled in Little Bucharia. Silks were first brought from China to Syria and Egypt, by traders, who, in caravans, performed journeys of 243 days, through the deserts of Asia. The price was far beyond the reach of any but the rich; and for a long time the use of silk among the Romans was confined to women of fortune. The Emperor Aurelian refused his queen a garment of silk, by reason of the high price it bore—its weight in gold. In the sixth century, two monks, who had been employed as missionaries in the East, penetrated into the country of the Seres, and observed the labors of the silk worms, and the manner of working their productions into elegant fabrics. They imparted the secret to the emperor Justinian, at Constantinople, who induced them, by a great reward to return and bring away a quantity of the silk worm's eggs. They put the eggs into the hollow of a cane, and brought them safely to Constantinople, about the year 555. The eggs were hatched, and the worms were fed with mulberry leaves; and the insects produced from this cane full of eggs, were the progenitors of all the silk worms of Europe, and the western parts of Asia. The people of the Morea, and of the cities of Athens and Thebes enjoyed the profit of the culture and manufacture of silk upwards of 400 years; but in 1146, the king of Sicily made war upon Greece, and carried off a great number of silk weavers, who taught the Sicilians to raise silk worms and weave silk stuffs. The Saracens introduced the silk manufacture into Spain and Portugal; and subsequently the Italian States, France, and England engaged in it.

It will not consist with our limits to enter minutely into the history of the silk business in foreign countries. Much of the silk used in the manufactures of France, is raised at home; yet it is stated that that country pays nearly twenty millions of dollars annually, for raw silk, raised in other countries.

The art of reeling silk from the cocoons, so as to convert it into a saleable article, is known only in China, in Bengal, in the Turkish dominions, in Italy, and in the south of France. It is not known in Great Britain, where the climate is not suited for that culture. Her manufacturers are obliged to depend upon foreign countries for the raw and thrown or twisted silk, which they use, and of which several millions of pounds are annually imported into that country.

The manufacture of this silk into various fabrics, employs a large capital, and many thousands of men and women. "I calculate," said Mr. Wilson, a well informed and extensive silk manufacturer, while under examination before a committee of the House of Lords, "that 40,000 persons are employed in throwing silk for the weaver, whose wages will, I think, amount to £350,000. I estimate that half a million pounds of soap, and a large proportion of the most costly dye-stuffs are consumed, at a further expense of £300,000; and 265,000 more are paid to 16,500 winders, to prepare it. The number of looms may be taken at 40,000; and including weavers, warpers, mechanics, harness makers, enterers, twisters, cane-spreaders, quill-winders, and draw-

boys, at two hands to a loom, will employ 80,000 more persons and the wages amount to £3,000,000. If we include infants and dependants, about 400,000 mouths will be fed by the silk manufacture, the value of which I estimate at TEN MILLIONS." Mr. Hale, of Spitalfields, estimates the number of persons supported by the silk manufacture, at 500,000; but Mr. Bell, and some other intelligent gentlemen engaged in the trade, do not carry their estimate so high as Mr. Wilson; perhaps his, which is the medium, may be regarded as the most accurate.

Since the settlement of the United States, by the English, several experiments have been made on the subject of raising silk. The culture of it first commenced in Virginia. As early as 1666, the rearing of silk worms was a part of the regular business of many of the farmers. One man had 70,000 mulberry trees growing in 1664. Georgia sent eight pounds of raw silk to England, in 1735, and 10,000 pounds in 1759. Some attention was paid to the culture of silk in South Carolina, and in 1755, Mrs. Pinckney raised and spun silk enough for three complete dresses. In Pennsylvania and New Jersey, the culture of silk began in 1771, but was suspended by the war of the revolution.

Mulberry trees and silk worms were introduced into the town of Mansfield, in the county of Windham, Conn., about the year 1760; and in 1789, two hundred pounds of raw silk were made in that town. At present, three fourths of the families in Mansfield are engaged in raising silk, and make annually from five to ten, twenty, and fifty pounds in a family, and one or two have made, each, one hundred pounds in a season. It is believed that there are annually made in that town and the vicinity, from three to four tons of silk.

From the experiments which have already been made, ample evidence exists, that the culture of silk may be profitably pursued in the United States to almost any extent, since the mulberry tree grows indigenously throughout the country; and it is a fact well ascertained, that American silk is decidedly superior to that of any other country on the globe. In France, twelve pounds of cocoons are required to produce one pound of raw silk, while eight pounds are amply sufficient to produce the same quantity in this country.

Were the culture of silk only equal to our home consumption, an immediate attention to it would be a saving to the country of not less than ten millions of dollars annually, as may be seen by the following

*Statement of the value of silk goods imported and exported in the years 1821 to 1825 inclusive.*

| *Years.* | *Imported.* | *Exported.* |
|---|---|---|
| 1821 | $4,486,924 | $1,057,233 |
| 1822 | 6,480,928 | 1,016,262 |
| 1823 | 6,713,771 | 1,512,449 |
| 1824 | 7,203,344 | 1,816,325 |
| 1825 | 10,271,527 | 2,565,742 |
| | $35,156,494 | $7,968,011 |

Yet there cannot be a doubt that a quantity may be annually produced, which shall not only meet the home demand; but in a few years, leave a surplus for exportation. The most important step towards this

state of things is the extensive cultivation of the white mulberry tree, the leaves of which form the proper aliment of the silk-worm.

MULBERRY TREE. All practical writers agree that the proper soils for the mulberry tree are dry, sandy or stony. Indeed, a soil which is of little value to the farmer on account of its sterility, will answer well for the mulberry tree. The methods of propagating the tree are various. A writer in the New England Farmer speaks as follows of four methods.

First, from the seed; 2d, from roots; 3d, from layers; and 4th, from cuttings. The 1st and 4th can at present be alone generally resorted to in this country. An ounce of good, well cleaned seed, well managed, will probably produce ten or twelve thousand plants. It should be sowed towards the last of April. The ground being properly prepared, by previous ploughing, or digging, and manuring, is to be cleaned, levelled, and divided into beds of four or five feet in width. Drills from six to ten inches asunder, and from one to two inches deep, must then be made by a line. The seeds may be sowed in these drills dry, or having been steeped two days in water, rub it on pack thread to which it will adhere, lay the thread in the bottom of the drill and cover it with earth. In two or three weeks, if kept moist, the young plants will appear. Keep the beds clear of weeds. On the approach of winter it may be well to cover them with leaves. If the seedlings grow the first season to the height of one foot or more, take them up in the spring following, cut the top so as to leave about three inches above ground, cut off the lower part of the root, and set them in nurseries in rows, like other fruit trees, where the following spring they may or may not be grafted, pruned and cultivated, until they become sufficiently large to set in *hedges* or *plantations* Cuttings should be taken from perpendicular shoots, and particularly from those which terminate branches. They should be of the last summer's growth, and from 6 to 15 inches in length. Plant them in shady borders, early in the spring, about two thirds of their length in the ground; close the earth well about them, and in dry weather let them be watered. After a year, they may be transplanted in open nursery rows, if well rooted.

Another mode of cultivating the mulberry, and one which has been to some extent adopted in New England, is to sow the seed *broadcast*, like turnips in the spring; and in the following season to cut the plants with a scythe when wanted. The mowing is regularly prosecuted every morning, in the quantities required, and unless the season is one of severe drought, the field will be cut twice or thrice before the worms begin to wind up.

The advantages of this last mode are stated to be

1. The leaves are gathered with less labor and expense, being cut and taken together like hay, or grain.

2. The leaves are larger and more tender, than on the grown tree, and the worms eat with more appetite, and produce more silk.

3. The time for gathering the supply is so short, that the leaves are got with the morning dew upon them, which is deemed by practical men an essential advantage. Other writers say that the leaves when given to the worms should be thoroughly dry.

4. More worms can be supported from a given space of ground, and

the mulberries are ready after one season, instead of waiting several years for the formation of an orchard.

The importance of the culture of silk will be our apology for giving at some length, directions for the raising of silk worms for which we are indebted to a valuable work entitled, "Essays on American silk, &c., by John D'Homergue."

EGGS OF SILK WORMS. The eggs of silk worms so strongly resemble the seeds of the poppy, that they may easily be taken for them; and the contrary. In Europe, the latter have sometimes been sold for the former. Pure water is however, an effectual test; good eggs sinking to the bottom, while poppy seeds and bad eggs will swim. Eggs which have been washed, should be dried by exposure to cool and dry air. They should be kept in a cool place until the hatching season. Cold does not injure them provided that they do not freeze.

HATCHING THE EGGS. The general rule in Europe is to put the worms to hatch, as soon as the mulberry trees begin to bud. In this country, this happens usually about the 21st of May. Should the season of budding, however, be delayed, the hatching should be proportionally deferred.

The manner of putting the eggs to hatch, according to M. D'Homergue, is as follows:—"They should be put in a pasteboard or wooden box, not covered at the top, and the sides not more than half an inch high, so that the worms, when hatched may easily crawl out, as will be presently mentioned. The size of the box should be suited to the quantity of eggs to be hatched, so that they be not on the top of one another; but they may touch each other. The box should be covered with paper, perforated with holes of the size of a large pin's head, so that the worms when hatched, may easily pass through them. They are usually hatched in three days, after being put into the box. When they are near coming out, young mulberry leaves should be put on the top of the box, leaving spaces. The worms as soon as hatched will smell those leaves, crawl up to them through the holes in the paper cover, and begin feeding. Now remove such leaves as are covered with worms, gently to the table or hurdle, which has been prepared to receive them. It should be added that a warm place should be provided for the eggs to hatch in, where the temperature is at least eighty degrees Fahrenheit.

REARING SILK WORMS. The worms after being hatched as above described, are to be laid on wicker hurdles, which are to be kept quite clean. Pine tables will answer well.

During the first day the room should be kept in the same degree of heat: but, afterwards, as the strength of the insect increases, a lower temperature is admissible. Dry air from the north and west may be let in; but all dampness should be carefully excluded.

The greatest cleanliness should be maintained. In order to clean a table, place another table close to it, on which lay fresh mulberry leaves. The worms will immediately crawl to them, leaving the first table empty. This shifting of the worms, however, should not take place, until after their first *moulting*. They generally moult, or shed their

skin four times. During the moulting, which lasts twenty-four hours, they lie torpid, and do not feed. They should then be left quiet.

RISING OF THE SILK WORMS. "When the silk worms are ready to make their cocoons, which, in this country, generally, is on the 31st day after they have been hatched, a kind of artificial hedge, not above one foot high, must be prepared, by means of some brushwood without any leaves, which is to be fixed along the wall, behind the table on which the worms are. They crawl of themselves in this hedge, which is called *rising*, and there make their cocoons. This brushwood must not be fixed straight up along the wall, but should be inclined above and below, in the form of a semicircle towards the table on which it is to rest, because the worms always move in a circular direction; and also in order that, if they should fall, they may not fall upon the table or floor, but on some part of the artificial hedge, whence they may crawl up and carry on their work.

It is easy to know when the worms are ready to rise. They crawl on the leaves without eating them; they rear their heads as if in search of something to climb on, their rings draw in, the skin of their necks becomes wrinkled, and their body becomes like soft dough. Their color also changes to a pale yellow. When these signs appear, the table should be cleaned, and the hedge prepared to receive them.

From the moment that the cocoons begin to rise, they cease to eat; they must not be touched, nor their cocoons, until they are picked off, as will be presently mentioned.

PICKING OFF THE COCOONS. "The worms generally form their cocoons in three days after their rising; but they are not perfect until the sixth day, when they may be picked off from the hedge. In Europe it is not done till the eighth day, nor should it be done sooner in this country, if during the six days there have been violent thunder storms, by which the labors of the moth are generally interrupted. The cocoons must be taken down gently, and great care taken not to press hard on them; because if in the least flattened, they fall into the class of imperfect cocoons, and are greatly lessened in value.

In picking the cocoons from the hedge, the floss or tow with which they are covered must be delicately taken off, always taking care not to press too hard upon the cocoons.

After the cocoons are thus taken down, some are preserved for eggs, and others kept for sale."

COCOONS KEPT FOR USE. "In order that the farmer may judge of the quantity of cocoons that it will be proper or advisable for him to put aside and preserve for eggs, it is right that he should be told that fourteen ounces of cocoons will produce one ounce of eggs, and one ounce of eggs will produce a quintal of cocoons.

In selecting the cocoons to be kept for eggs, it is recommended to select the white ones in preference, and keep the colored ones for sale; attention should be paid to having an equal number of males and females, and they are generally known by the following signs; the male cocoons, that is to say, those which contain the male insects, are in general smaller than the female, they are somewhat depressed in the middle, as it were with a ring; they are sharp at one end and sometimes

at both, and hard at both ends ; the female cocoons, on the contrary, are larger than the male, round and full, little or not at all depressed in the middle, and not pointed at either end. They may easily be discerned by a little habit.

It is particularly recommended to take off all the floss or tow from these cocoons, so that the moth may find no difficulty in coming out.

After the cocoons have been taken down from the hedge, those which are intended for eggs should be laid, but not crowded, on tables, that is to say, the males on one table and the females on another, that they may not copulate too soon, and before they have discharged a viscid humor, of a yellow reddish color, which prevents their fecundity. They discharge this humor in one hour after coming out of the cocoons, which is generally ten days after these have been taken down from the hedge; but this may be accelerated by heat.

At the expiration of one hour after the moths have come out of their cocoons, the males and females may be put together on tables or on the floor ; the tables or floor ought to be previously covered with linen or cloth, on which, after copulation, the females lay their eggs. One female moth or butterfly generally lays 500 eggs; the male and female remain about six hours together, during which time they copulate ; after which they separate, and the female is 48 or 50 hours laying eggs; but the greatest quantity during the first 40 hours.

From the moment the moths have come out of their cocoons until the females have laid all their eggs, the room must be kept entirely dark ; the light debilitates them and makes them produce but few eggs, and the worms that come from them are weak and puny.

When the female moths have done laying eggs, all the insects must be taken away, and may be given as food to fowls. The eggs must remain on the cloth where they have been deposited during fifteen or twenty days, until they shall have become of an ash or slate color, when they are perfectly ripe, and may be considered as good eggs. Then the cloth or linen must be folded, and kept in a cool and dry place, until it shall be thought proper to take off the eggs, which is done by putting the cloth into pure water, and when thoroughly wetted, scraping gently the eggs from the cloth, taking care not to injure them. When thus scraped into the water, all the good eggs will go to the bottom, and the bad, if any, will swim at the top.

The eggs being thus washed, must be dried in the open air, and when perfectly dry, the best mode to preserve them is to put them into hollow reeds or canes, perfectly dry, and closed at the two extremities with a thin piece of flaxen or cotton linen well fastened. It is also the best means to transport them from one place to another."

COCOONS INTENDED FOR SALE. "In order to prevent the cocoons from being perforated by the moths escaping from them, which greatly lessens their value, it is necessary to kill the moths. This is generally done by baking in an oven or by steam, but the best mode which is peculiarly well adapted to warm climates, is to lay the cocoons on linen or cotton sheets, but not too close, or one upon another, and to expose them thus to the heat of the sun in open air, when it is perfectly dry, during four days, from 11 A. M. to 4 P. M., taking great

care in handling them not to crush or flatten them, which is of the highest importance. In that time there is no doubt that the moths will be killed.

The processes of steaming and baking are not always safe, because they may be overdone and the silk greatly injured. Yet if the weather should prove obstinately damp or rainy, those processes must be recurred to, but not in dry sunshiny weather, when they can be avoided.

The last thing to be spoken of is the packing of the cocoons to send to market. They must be put in boxes with great care, not pressed too close, lest they should be flattened, and close enough that they should not suffer in like manner, by striking hard upon each other in consequence of the motion of carriages or stages. The boxes being dry and well conditioned, may be transported by steamboats; if transported by sea, they should not remain longer than fifteen days on salt water, lest they should become mouldy. On river water, and particularly by steamboats, there is not the same danger. The boxes, in every case, should be covered with a tarpaulin or good oiled cloth, that they may in no case suffer from dampness or rain.

The price of cocoons in France, is from twenty-five to thirty-five cents per pound of sixteen ounces; I mean of perfect cocoons. Perforated cocoons, from which the moth has escaped, those which are spotted, and the imperfect ones, called *chiques*, command no price, and are generally given away by the silk culturers. There are but few of them, because those who raise silk worms, being experienced in the business, produce hardly any but good cocoons. When these are sold, the bad ones are thrown into the bargain.

The price of cocoons in this country cannot yet be settled; but it will be the interest of the silk culturist to sell them in the beginning as cheap as possible, to encourage the silk manufactures, which alone procure them regular purchasers, and without which, their produce must lie upon their hands."

LINEN. Linen cloth, it is well known, is manufactured from flax, an annual plant, with a slender, hollow stem, usually about two feet high, the bark of which consists of fibres, which, when dressed, are extensively worked into this cloth, and other articles, in various countries of the globe. Linens are manufactured for exportation to the greatest extent, and of the finest quality, in Ireland, Holland, Bohemia, Silesia, Moravia, and the Netherlands. The linen manufacture is the staple branch of Irish industry; and in Bohemia alone, it is said to employ more than three hundred thousand persons. The annual value of it in Silesia, is 1,500,000*l* sterling; and there are whole villages and towns occupied by weavers. Russia has three hundred factories of linen; and this forms the most important manufacture and export of the Hessian States in Germany. In other parts of Europe, and in the United States, it has been carried on to a limited extent, and chiefly for home consumption. A late writer remarks, that "the length and comparative rigidity of the fibres of flax, present difficulties in the way of spinning it by the machinery which is used for cotton and wool. It cannot be prepared by carding, as these other substances are, and the rollers are capable of drawing it but very imperfectly. The subject of spinning flax by machinery, has attracted much attention; and the Emperor Napoleon, at

one time, offered a reward of a million francs to the inventor of the best machine for this purpose. Various individuals, both in this country and in Europe, have succeeded in constructing machines which spin coarse threads very well, and with great rapidity. But the manufacture of fine threads, such as those used for cambrics and lace, continues to be performed by hand, upon the ancient spinning wheel.

CAMBRIC is a species of linen made of flax, very fine and white, the name of which was originally derived from the city of Cambray, where it was first manufactured. It is now made at other places in France, as well as in different parts of England, Scotland, and Ireland; but French cambrics are still preferred for their extreme fineness and durability.

LACE is a complicated, ornamental fabric, formed of fine threads of linen, cotton, or silk. It consists of a net work of small meshes, the most common form of which is hexagonal. In perfect thread lace, four sides of the hexagon consist of threads which are twisted, while in the remaining two, they are simply crossed. Lace is commonly made upon a cushion or pillow, by the slow labor of artists. A piece of stiff parchment is stretched upon the cushion, having holes pricked through it, in which pins are inserted. The threads previously wound upon small bobbins, are woven round the pins and twisted in various ways, by the hands, so as to form the required pattern. The expensiveness of the different kinds of lace, is proportioned to the tediousness of the operation. Some of the more simple fabrics are executed with rapidity, while others in which the sides of the meshes are plaited, as in the Brussels lace, and that made at Valenciennes, are difficult, and bear a much higher price.

The cheaper kinds of lace have long been made by machinery. And recently the invention of Mr. Heathcoat's lace machine has effected the fabrication of the more difficult or twisted lace, with precision and despatch. This machine is exceedingly complicated and ingenious, and is now in operation in this country and in France as well as in England.

The best *white* lace has usually been made of flax; but the *cotton* can now be spun so neatly and finely, that the use of it, even in *bone-lace*, has completely, in England, superseded the use of flax; and indeed, *woven lace*, is now got up in that country, so neatly as to have also superseded, in a great degree, the use of that made by the hand. *Gold* and silver thread is also wrought into lace. This is a stout fabric, commonly close, but wrought so as to exhibit some sort of figure. It is made of different widths, but all narrow like ribbon. There is also a *worsted lace*, of a similar texture, commonly wrought with various patterns in colors. This was formerly much used on liveries, and may still be seen occasionally on the lining of carriages.

CULTURE OF FLAX. While the people of the United States were British colonies, the culture of flax was more attended to than since they have become independent. In the year 1770, there were exported in one year, upwards of 312,000 bushels of flax seed. For twenty years preceding 1816, the annual exports of this article averaged but about 250,000 bushels. The causes of this decrease it is unneces-

sary in this place to mention. It cannot be doubted, that the cultivation might be profitable to the people of this country, and that it will be more extensively cultivated in future years, scarcely admits of a question. Much of the soil is excellently well adapted to the raising of flax. This is true of considerable portions of the state of Maine, of New England, the western parts of the state of New York, New Jersey, Pennsylvania, and southward of the cotton latitude. In view of the importance of this subject to our country, we shall give at some length, directions for the cultivation of flax, for which we are indebted to an able essay from the pen of S. W. Pomeroy, Esq., published in the Massachusetts Agricultural Repository.

Soil. "The soils which rank first in this country," says, Mr. Pomeroy, "are the flat bottoms that are covered by the fall and spring floods, which subside early enough in the season to get in a crop; those river flats on the second banks, that have a depth of strong alluvial soil: the reclaimed marshes and swamps, with a black, unctuous soil, not too peaty, with as much clay in the composition as will permit its being rendered soon dry and mellow, and not retain water on or near the surface; if it stands two feet below, so much the better, but must be well guarded by ditches and dykes against sudden freshets. Such is the soil of the province of Zealand, where more flax is raised, and of a better quality, than in any other part of Holland. The next in estimation are the strong black loams on clay, or hard pan, that will retain moisture. Yellow loams, with a holding sub-soil, may be rendered suitable for flax, by proper cultivation: and since the discovery, that plaster of Paris is an excellent manure for it, a crop may be obtained with much more certainty on lighter land than formerly. Perhaps the characteristic of best garden mould may be applied to a flax soil, viz. retaining sufficient moisture, and all that falls, without ever being saturated; but on any soils, the surface should be completely pulverized, and never worked when wet.

Manures. "No dung should be applied to the land when the flax is sown; but may be put on bountifully with the previous crop. The objection is, that dung forces the growth so rapidly, that the plants draw weak, have thin harle, and are more liable to lodge. Lime, marle, shells, leached ashes, &c., do not produce such effects. Top dressings, soon after the plants appear, or plaster, ashes, soot, &c. are highly beneficial, as they not only encourage the growth, but are a protection against worms, which sometimes attack the young plants, and may be considered the only enemy they have, except weeds.

"Salt has been mentioned by the late Dr. Elliott, of Connecticut, as an excellent manure to plough-in with the flax, at the rate of 5 bushels to the acre; probably more would be better. Plaster is now much used in Duchess county, the best cultivated district in New York, as a manure for flax, on which its good effects are as apparent as on corn.

Preparation of the land. "It is not unfrequent in Ireland, to obtain crops of flax from green sward, on which they put lime, shells, limestone, gravel, &c., and break up in the fall, cross ploughing and harrowing fine in the spring; but it most commonly succeeds a crop of potatos, which receive the manure. In Flanders, hemp was formerly more used as a preparation for flax, than since the introduction of potatos. In

Italy, it commonly precedes flax, and although the land gets no tillage, as the hemp is well manured, it grows strong, and is then a powerful destroyer of weeds. In England, on some of the fen soils of Lincolnshire, the usual course is hemp two or three years in succession, well manured, then flax without manure; a crop of turnips is often taken the same season after the flax, and hemp succeeds again. In Russia, it is said that extensive crops of flax are drawn from new cleared lands, after burning them over, and harrowing in the seed with ashes. The best preparatory crops in this country, at present appear to be potatos, corn, and roots; they will most generally repay the extra manure, and if well managed, check the production of weeds.

"The following rotations may serve as an outline, subject to be varied, and hemp or other crop introduced, as circumstances require, viz.—

No. I.—Low, cold, or reclaimed soils.

1st year, *Potatos.*
2d do. Flax, with seed.
3d do. *Herds grass* and *red top*, or *tall meadow oat grass*, to continue three years or more and the course repeated.

No. II.—Strong uplands.

1st year, *Potatos* or *corn.*
2d do. *Corn* or *roots.*
3d do. Flax, with seed.
4th do. *Clover.*
5th do. *Orchard grass*, or *Herds grass*, to continue three years or more.

No. III.—Light lands.

1st year, *Potatos* or *corn.*
2d do. *Corn* or *roots.*
3d do. Flax, with seed.
4th do. *Clover*, to be mown once, the after growth to be turned in, and *rye* sown, thick on the furrow, which may be soiled or fed in the spring, by sheep, or milch cows, and ploughed in; for
5th year, *Corn.*
6th do. *Spring wheat* or *Barley.*
7th do. *Clover*, and the course to be pursued as before, when flax will occupy the land every seventh year. In all cases, except when hemp is substituted, the tillage crops should receive the dung.

"If the land is ploughed into beds, or convex ridges, like turnpike roads, about a rod wide, especially if low and level, the crop will be much more secure from injury by heavy rains, and the grass crop will be better if it remains in that form. On any soils, fall ploughing in narrow ridges will facilitate its early working in the spring, and should not be dispensed with.

Choice of seed.—"That of the last year's growth should be obtained if possible. The usual marks of good seed are, that it be plump, oily, and heavy, of a bright brown color, sinking readily in water, and when thrown into the fire to *crackle* and *blaze* quick. A very simple method of trial is to sprinkle it thin between two pieces of wet paper, which plunge into a hot-bed or dunghill, and in less than twenty-four hours,

CULTURE OF FLAX.

the proportion that will vegetate can be discerned, which should be ascertained in order to regulate the

QUANTITY OF SEED TO BE SOWN.—"On this head, no particular directions can be given, as it depends on the various qualities of soil, goodness of seed, &c. The rule for seeding small grains is *reversed;* flax requiring to be sown thickest on a rich soil, as not more than one stalk is wanted for a plant. In England and Scotland, never less than two nor more than three bushels to the acre are sown. Two and a half is the most usual portion. In Flanders and Ireland, seldom less than three bushels are sown, except when seed is an object. Thick sowing is to obtain fine flax. In this country, it will be important, at present, to sow at such a rate as will ensure good crops of each; and experience only can determine the exact point.

"If sown very thin, too many lateral branches will be thrown out, each producing a boll or pod, affording more seed, but shorter, and inferior flax. If sown too thick, the plants will draw up weak, with a single boll on a plant, and, subject as our climate is to heavy showers and thunder gusts, very liable to lodge—one of the greatest dangers a flax crop has to encounter. The commissioners for promoting flax culture in Scotland, considered it as practicable, and strongly recommended that the system should be so conducted, as to obtain good flax and good seed at the same time. It is so viewed in Ireland, among the more extensive cultivators, except when wanted for fine linen, cambric, lawn, &c." Dr. Deane, in the 'New England Farmer,' a work of great merit published some thirty years since, when flax culture was more attended to than at present, recommends from six to seven pecks. It is probable that six pecks is the least, and two bushels the extent that should be sown to obtain the most profitable results, till the demand for seed is considerably lessened.

SOWING. "The seed should be got in as early as it is possible to sow the ground. Dr. Deane observes that a slight frost after the plants are up, will not injure them. For no crop is it more important that the seed should be equally distributed. Fortunately, what has long been a desideratum is now attained. A machine, (Bennett's machine,) for sowing small seeds broadcast, with perfect regularity, great expedition, and in any desired quantity, has lately been invented, and performs to great satisfaction.

WEEDING. "Weeding is considered in Europe, and by good husbandmen in this country, as necessary to procure a good crop of flax, which is a very tender plant when young, and more easily checked in its progress by weeds than any other. It is not supposed to be injured by the clover and grass sown with it; on the contrary, the Flemish farmers think them beneficial, by protecting the tender roots from drought, and keeping the weeds under. It should be carefully wed when the plants are three or four inches high; they are not then injured by the laborer going barefooted over them.

PULLING. "This should be performed as soon as the leaves begin to fall, and the stalks show a bright yellow color, and when the bolls are turned a little brown. The seed will continue to ripen afterwards. When the flax is lodged, it should be pulled immediately, in a stage of

its growth, or it will be entirely lost; great care is requisite in sorting the different lengths, and keeping them separate till after the flax is hackled, or much waste will ensue in that process.

SAVING SEED. "As soon as the flax is dry enough to put under cover, the bolls should be rippled, as it is termed. A comb resembling the head of a rake, but with teeth longer and nearer together, made of hickory or oak, is fastened upon a block, and the flax taken in parcels no larger than the hands can firmly grasp, is drawn through, and the bolls rippled off; attention to sorting at the same time, should be continued. The bolls are to be riddled and winnowed immediately; spread thin on a clean floor, or on sheets in the sun, and when sufficiently dry, and beginning to open, threshed. By this method, the foul seeds are completely separated with little trouble, and good clean seed is ready for an early market, often the best, without the use of expensive machinery to make it so.

"The preparation of flax by steeping is very general in the great flax growing countries of Europe, but it is not quite finished in the water. It remains spread some days on the grass, which is necessary to render it soft and give that silvery appearance so desirable. The destructive process of dew rotting, is most commonly practised in this country, and when water is resorted to, it is at an improper season, and the process imperfect; which is the cause of its being so harsh and brittle. Perhaps no part of the system requires such an allowance for difference of climate. In the humid atmosphere of Ireland, it is not very material when it is spread; but in this climate, when exposed to a July or August sun, every drop after a shower, becomes a burning glass, and literally scorches the fibres; besides, such a highly putrid fermentation as will then take place in the water, though it separates the harl more speedily, not only injures it, but communicates a stain that renders the process of bleaching much more tedious and expensive.

"The flax should not be put into the water till about the first of October, and remain from ten to fourteen days, according to the temperature of the weather, and should be taken out before the fibres will separate freely, spread on the grass, when the frost will very much assist the operation, and the flax exhibits a gloss and softness, that it is impossible to give it otherwise.

"Clear, soft, stagnant water is preferred in Europe. A canal, forty feet long, six broad, and four deep, is said to be sufficient for the purpose of an acre of flax at one time. It should be formed on a clay, or some holding soil, where the water from a spring or brook can be conducted in with convenience. The expense would not be great, and on most farms suitable sites may be had. May not boiling or steaming be found the most advantageous process of preparing flax? The very superior sample of thread exhibited at Brighton, in 1818, for which Mrs. Crowninshield, of Danvers, Mass., received a premium, was spun from flax prepared by boiling! It appears by the 'Transactions of the Swedish Academy,' that a method was practised in Sweden of preparing flax to resemble cotton, by boiling it ten hours in salt water, spreading on the grass, and frequently watering, by which it becomes soft and bleached. Boiling or steaming will not appear very formidable or expensive, when we examine the subject. A box twenty feet long, six

feet wide, and four deep, well constructed with stout plank, a boiler, from which a large tube extends into, and communicates with the water in the box, will boil the produce of a quarter of an acre in a day, that is, if we allow double the room to boil in, that is required for steeping. A steam-pipe, instead of a tube, and having the top of the box well secured, would permit the process of steaming to go on. It is probable that by either method, grassing will be necessary, to obtain soft flax. The yarns of which the sail cloth is made at Patterson, are all steamed. The navy board expressly forbid their being boiled in alkaline lye, as is usual in most manufactures of linen. It is from this precaution that their canvass has the pliable oily feeling, which so much recommends it. It should not be lost sight of, that by boiling or steaming, much time and expense will be saved in bleaching.

Dressing. "In this process, our climate gives us a decided advantage over Ireland, Flanders, or the north of Europe, where the flax is dried on hurdles over a peat fire, in ovens, or in kilns requiring great care in regulating the heat so as to prevent injury. All this trouble and hazard is obviated by our dry atmosphere and keen north-west winds. Dr. Deane estimated the expense of dressing flax by hand, at one-third the product. I believe the present price does not much vary from his estimate. A respectable gentleman from Duchess county, New York, informed me that mills or machines, impelled by water, have been erected there, that break and completely dress the flax for the toll of one tenth! It is said that one or more of them are in operation in the western part of Massachusetts. These mills were invented in Scotland, and are now said to be brought to great perfection. They are erected in all directions in the principal flax districts in Ireland, and notwithstanding the low price and limited demand for labor, are resorted to by the poorer classes of people, the dressing by hand being mostly abandoned. There are machines in England that dress flax immediately from the field, without any preparation whatever. An account of them may be found in the fifth volume of the Massachusetts Agricultural Journal. It appears, by the report of a committee of the House of Commons, that in 1817 they were in successful operation. A man and three children impelled the machines, and dressed sixty pounds a day. We have no information of any further improvements. Should they be susceptible of the application of water or steam power, in any degree proportionate, the advantages may be incalculable, but in the present inquiry, we place these machines, however desirable, entirely out of the question.

Product. "It is not uncommon in Great Britain and Ireland, to obtain eight hundred pounds of flax from an acre! Six hundred pounds in some districts is estimated as an average; but it should be observed, that little, if any seed is obtained. The average crop in New England, as far as our information extends, cannot be estimated at more than two hundred pounds, and six or eight bushels of seed. (We do not include the rich bottoms on the Connecticut and some other rivers.) Dr. Deane was of opinion that four hundred pounds might be calculated on, with proper management.

"We think that four hundred pounds of good clean flax, and eight or ten bushels of seed, may fairly be assumed as a medium crop on fa-

vorable soils, where the culture becomes such an object as to make other farming operations subservient to it, and due attention is paid to the change of seed.

"Those who grow flax to any extent, are of opinion that the seed, at the price it has been for some years past, pays for all the labor bestowed on the crop to the time the flax is ready to be prepared or rotted."

HEMP is an annual plant of great use in the arts and manufactures, furnishing thread, cloth, and cordage. Hemp bears a near analogy to flax, not only in form, but also in culture and use. The bark of the stalk, as in flax, is the chief object for which it is cultivated. Hemp is manufactured into *Canvass*, *Russia Duck*, *Russia Towelling*, *Ticks*, *Dowlass*, &c. The process of manufacturing these various articles, we shall not find room to detail. This portion of our work will be more usefully occupied by *directions* as to the best mode of cultivating hemp in the United States.

That the cultivation of hemp is important to the farmers of the land can scarcely be questioned. The climate and soil are well adapted to it. The annual import of the article from Russia does not probably fall short of half a million of dollars. In addition to this, we annually import in duck, and other manufactures of hemp, exclusive of cordage, to the amount of more than a million and a half of dollars. This amount of hemp, and even more, might be brought to market in a short time, from our own soil, and the manufacture of the various articles now imported, might be carried on in our country, as well as those of cotton or woollen goods. American hemp, to say the least, is equal to the best Russia hemp. By an experiment made in 1824, by direction of the commissioners of the navy, it would appear that American hemp justly claims the superiority in respect to strength. "Two ropes, each 2¼ inches, one made of American, and the other of Russian hemp, broke, the former with 3209 lbs. the latter with 3118 lbs."

CULTIVATION OF HEMP. "Hemp, (says a writer in the New England Farmer,) requires a deep and rich soil. Any attempt to raise it upon a light soil, or upon land worn out and exhausted, until it is recruited by manure, and a fertilizing course of husbandry, will result only in disappointment. Nor can it long be continued on the same piece of ground, without an annual supply of manure. But upon a good soil, with an annual sprinkling of manure, at the rate of eight or ten loads to the acre, it may be continued for a succession of years, without any material diminution of the value of the crop.

"The ground must be prepared for the seed, much in the same manner as for flax. It must be ploughed and harrowed sufficiently to break the clods, and to render the soil fine and mellow. As different soils require different degrees of labor to produce this effect, it must be left to the judgment of the cultivator to determine when his ground is in a proper state to receive the seed. I can safely say, that few farmers err in ploughing and harrowing too much.

"The time for sowing is about the 10th of May. A few days earlier or later will make no difference. It must not be so early as to expose the tender plant to *severe* frosts, and if sown late in May, it will produce a light crop—the stalks will have a thin coat.

"No further attention to the crop is required until the season of pulling and cutting. Although the latter mode of gathering is attended with less labor, our farmers almost universally adopt the former as the most profitable. This commences about the 10th of August. The time of pulling is determined by the appearance of the hemp. There are two kinds of hemp in every field, distinguished by the names of the male and the female. The latter produces the seed, the former the blossom and the farina. The male hemp has but few and slender branches. When this has turned white or a pale yellow, has shed its leaves, and the farina has chiefly fallen off, then it is time to pull it. The female hemp has more and stronger branches, and continues fresh and green until the seed is ripe. It is common to leave patches, or narrow strips, where the seed hemp is most abundant, until the seed has ripened, which will be about a month after the time of pulling: in which case, the economical farmer will pull out the male hemp as far as it is practicable; for the fibres of the hemp that stand in the field until the seed is ripe, are always stiff and harsh, and will bring less in the market than that which has been pulled at the proper season.

"The pulling is a heavy job. One fourth of an acre is considered as a day's work, though expert hands will pull a third of an acre. No precaution is necessary except to guard against breaking the stalks. The laborer gathers a few stalks in his hands and pulls them up, and having repeated this three or four times, he strikes the roots once or twice with his foot in order to kick off the dirt, then holding the whole loose in his hands, lets the roots drop on the ground for the purpose of making that end of his handful even. And in spreading his hemp on the ground, he is careful to lay the butts straight and true. This will greatly facilitate the labor of binding.

"Rain upon the hemp after it is pulled, produces the same effect as upon mown grass. It discolors it and injures its quality. It must therefore be suffered to lie upon the ground no longer than it is necessary for its preservation. As soon as it is sufficiently dried, which in warm and drying weather will be after two days' sun, it must be bound up in small bundles or sheaves. A little rye straw is the cheapest and best thing for bands. Let the band be put on towards the top of the bundle, and then shoved down to about the middle, otherwise it will be difficult to bind close enough to hold together, through all the subsequent handlings. Set up 15 or 20 bundles together, well braced at the roots, to admit a free circulation of air, and to prevent it from blowing over, and let it remain in this situation until it is cured sufficiently to put into a stack or under cover. This may be done in good weather, after two or three days. In the construction of the stack, great pains must be taken, lest the rain should find a passage into it. It is safest to put it under cover, either under sheds about the barn, or by erecting one for the purpose.

"It may be asked, why not transport it to the place of rotting and immerse it in the water, immediately after it is pulled, or as soon as it is dry, and save the trouble of securing it from the weather? I am not prepared to say that this cannot be done with safety, under vigilant care and attention. It is believed, however, that it would be exposed to greater hazard of loss, than at a later period. At the time of pulling, the weather is hot, and the water warm. Putrefaction proceeds with great

rapidity. If the hemp should remain in the water a little too long, or if, after it is drawn from the water, there should be a long rain or a continuance of damp weather, to prevent its drying, it would be rotted too much, and the fibre would be materially injured if not destroyed. But when the hemp is immersed later in the season, after the weather and water have become cool, there is no risk in suffering it to remain in the water a short time longer than is necessary. It is also supposed that when the hemp is rotted in hot weather, there will be a greater proportion of tow—and after it is drawn from the water, the bands must be opened and the hemp spread, in order that it may dry quickly. It is also a busy season with the farmer, and he can attend to it at a later period, with less interruption to other branches of husbandry. These are the reasons which have induced our farmers to postpone the rotting till the latter part of October. As I have never tried any experiments with reference to this part of the process, and indeed, have had but little experience in the culture of hemp on my own farm, I will not give an opinion whether their reasons are well founded or not. I have not undertaken to point out the *best method*, in relation to any part of the process, but only to describe the course pursued in my own neighborhood.

"It has sometimes been made a question whether running or stagnant water was to be preferred. The latter is more generally used in England. The former has been universally applied here. A place is selected near the margin of some brook or small stream, which will afford a basin in which the hemp can be deposited, and where, by erecting a dam across the stream, the hemp can be covered with water.

"In the first place, the dam is built of a sufficient height to secure the requisite supply of water, leaving a gate-way in the natural course of the stream, and the top of the gate a little lower than the height of the dam, to let off the surplus water. After the dam is completed, shut the gate and try the dam, in order to ascertain whether it is water tight, and will stand against the pressure produced by raising the pond. If it proves sufficient, then let off the water and put in the hemp. A space of two or three feet should be left between the hemp and the dam, so that if a leak should be discovered, there may be room to stop it. This precaution may be unnecessary in an old and long tried dam, but should not be omitted in a new one. Put down a layer of hemp, laying the bundles compactly, then a second course on the first in a transverse direction, and so on, successively, until the whole crop is deposited in the bed, or as much as the basin will receive. Weights consisting of long and heavy timber, or plank, or slabs with stones upon them, must then be laid across the bed to prevent it from floating. Having deposited the hemp and secured it from rising, the gate-way may be closed, and the water raised upon the hemp. It will be observed that the level of the hemp must be lower than the top of the gate-way, so that the whole body may be immersed in water, and continued so until it is rotted.

"The length of time necessary to complete the rotting process depends much on the weather, and the temperature of water. It may be ascertained whether it has lain in the water long enough, by taking out one of the bundles, drying and breaking it. If the seed cracks easily,

and the rind or harl readily separates from the wood, it is sufficiently rotted. So also, if while it lies in the water, the roots will twist off easily. Hemp put into the water the last week in October, will generally require about three weeks. When put in later, I have known it lie seven weeks. If put into stagnant water, soon after it is pulled, five or six days is enough.

" When the hemp is rotted, open the gate-way and drain off the pond. The hemp must then be removed to a piece of grass land—the bundles laid upon the ground singly, and, after two or three days, turned over. When partially dried, it is carried and set up, inclining against a fence, where it remains until it is fit for the brake. It may then be carried to the building or shed where it is to be dressed ; or the brake may be carried to the hemp, as is generally the case here, and after it is broken, it is removed to the barn for the finishing process—or if the weather is not too severe, it may be dressed where it is broken.

" A cheap vehicle or sled, for the removal of the hemp from the pond, may be made of two pieces of slit work, about nine feet in length, with three cross beams of the same material. The stakes, driven closely through each beam and runner, will serve the double purpose of holding the sled together, and keeping the hemp from falling off. No tongue will be necessary. It may be drawn with chains. If, however, the grass ground is at any considerable distance from the pond, wheels may be necessary.

" In dressing, two brakes are used. The first, coarser than a common flax brake, the second, as fine as a flax brake at the head, with one additional bar in each jaw. If the hemp is well rotted and faithfully broke, but little remains for the swingling board. A man accustomed to the business, will brake and dress from 50 to 75 lbs. a day.

" The labor required to prepare a crop of hemp for market, is not inconsiderable. But it will be observed, that but a small portion of the labor comes at a season when the farmer is most busily occupied in gathering and securing his other crops. The pulling comes on soon after the hay and grain are secured. The rotting does not commence till after Indian harvest, and the winter grain is sown. The dressing is wholly done in cold weather, when the farmer has little occupation besides that of taking care of his stock and providing fuel. Every considerable farmer who has land suitable for hemp, might raise a few acres, without greatly interfering with his ordinary course of husbandry.

" The average crop is six or seven hundred pounds to the acre. I have raised nine or ten, but this was an unusual crop. The land was strong, and in *very fine* tilth. The hemp grew to a great height and was very uniform throughout the piece. The price of hemp in market, has varied, of late years, from $10 to $12,50 a hundred. Scarce any crop of field culture can be put upon the land, which will produce so great a result."

TANNING is the process of converting the skins of animals into leather.

It is difficult to determine when the art of tanning was first practised ; but that it was known at a very early period, there is little doubt. The real change, however, which skins undergo by being tanned, has not

been accurately known till of late years. It is now indubitably ascertained that a mixture of *gelatin and tannin*, of which we shall presently speak, although each is separately soluble in water, becomes insoluble in that fluid, and forms the substance so well known as *leather;* hence, as the chief constituent of all animal skins is gelatin, the ease with which, by immersion in a solution of tannin, they are converted into that useful substance. The processes of tanning are nevertheless numerous, and somewhat complicated and tedious. The skins are in general, after being freed from their horns, ears and blood, and other impurities, placed in lime pits, for a longer or shorter period, in order to their hair and scarf-skins being more readily removed; after which they are immersed in a pit containing water and sulphuric acid. This operation is called *raising*, which disposes the skin more readily to combine with the tannin. It is next placed in the tan pit, with a layer of oak bark, ground fine, between each skin; the pit is then filled with tanning ooze, prepared from oak-bark and water, where the skins remain a month or six weeks, when they are taken out, a fresh quantity of bark and ooze is put in as before, and the process is thus continued till the skins are completely tanned; and they will become so in a shorter or a longer time, depending upon the thickness of the skin and the manner in which the application of the tannin has been made. When sufficiently tanned, they are taken out, and after undergoing certain manipulations, are dried and weighed. The time required for the processes of tanning varies exceedingly; the larger skins require from six to fifteen months to be effectually tanned. The processes are also varied for different skins; but we cannot detail them.

TANNIN, to which we have adverted in the preceding article, exists in large quantity in various vegetable substances; it is found particularly in abundance in the bark of oak, Spanish chestnut, willow, elm, ash, &c. In this country, however, leather is tanned chiefly by the use of the bark of the oak, which is ground in a mill by tanners for the purpose.

CURRYING is the last process to which tanned skins are subjected; it is applied to those destined for the upper leather, legs of boots, seats of saddles, and such purposes as do not require either great strength or impermeability by water, and never to sole leather. Currying leather consists in shaving or scraping the flesh side of the tanned skin with a straight edged two handled knife, against a wooden bench or stock, and thus reducing the tanned skin to a uniform and determined thickness, according to the purpose for which it is designed. After being thus shaved (if designed for common shoes and boots,) it is rubbed with train oil and rendered soft and flexible, while the shaved side of the leather has assumed a shining, fibrous appearance. In this state the flesh side is waxed or blackened with a mixture of oil and lamp-black. But where the leather is not oiled in dressing, the hair side of the skin, if it be required to be black, after being duly scoured clean with a pumice-stone, is dyed with a solution of sulphate of iron in water, or some other dye.

PARCHMENT is the skins of sheep or goats, prepared after such a manner as to render them proper for writing upon, covering books, &c. When parchment was first used as a material for the reception of

writing, is not exactly determined. It is, however, tolerably certain, that it was used long before the Christian era; and it is said that the name *parchment*, or *charta pergamena*, is derived from *Pergamus*, a city of Asia Minor, where it was invented in consequence of Ptolemy having forbidden the exportation of the *papyrus* from Egypt. Before the invention of paper, parchment necessarily formed a considerable article of commerce, as, for many centuries, most of the books of Europe were written on it. Its use is now confined chiefly to legal instruments and the covers of books.

The *manufacture of parchment* is begun by the skinner, and finished by the parchment maker. The skin, having been stripped of its wool, and passed the lime-pit, is stretched on a frame perforated lengthwise, with holes, furnished with wooden pins, which may be turned at pleasure, like those of a violin. When sufficiently stretched, the flesh is pared off with a keen-edged instrument; the skin is then moistened with a white rag, and a kind of white stone or chalk, reduced to fine dust, being strewed over it with a large pumice-stone, flat at bottom, similar to a muller for grinding colors, the remainder of the flesh is scoured off. It is then gone over again with an iron instrument, moistened as before, and rubbed with the pumice-stone without any chalk underneath. The flesh side being thus treated, the iron is passed over the wool or hair side; the skin is then stretched again tight on the frame by means of the pins, and the flesh side is again gone over with the iron. More chalk is now thrown on, and the skin is swept over with a piece of lamb-skin that has the wool on; this smooths it still further, and gives it a white down or nap. It is now left to dry, and when dried, taken off the frame by cutting it all round. The skin, thus far prepared by the skinner, is taken out of his hands by the parchment maker, who first scrapes or pares it dry on the *summer*, a calf-skin well stretched on a frame, serving as a support to the skin, which is fastened over it with a wooden implement that has a notch cut in it, with an iron instrument like that above mentioned, only finer and sharper; with this, worked with the arm from the top to the bottom of the skin, he takes away about one half of its thickness. The skin being thus equally pared on both sides, the pumice-stone is passed over each side, to smooth it. This last process is performed on a kind of form or bench, covered with sacks stuffed with flocks, and leaves the parchment in a condition for writing on. The parings taken off the leather, are used in making glue, size, &c. As there is a great waste in reducing the skins to a proper thinness in this mode, an instrument has lately been invented for splitting each skin in two.

SHAGREEN; a kind of very hard grained leather, brought from Turkey, Poland, Algiers, &c.; it is used as covers for cases, books, &c. It is made thus:—The skin, having undergone the necessary preparations, is covered, while wet, with a layer of small round seeds, which are pressed down upon it by weights. In this state it is suffered to dry, and then the rising parts are shaved off, till the surface is quite smooth. Being wetted, the parts depressed by the seeds swell up, and appear like so many tubercles, which retain their figure after the skin is again dried. The best is of a brownish color. It is extremely hard; yet, when steeped in water, becomes very soft and pliable, whence it becomes

of great use among case makers. It takes any color that it is given to it; red, green, black, yellow. The skin of some of the species of shark or dog-fish, being very rough, was formerly sold as shagreen, but its prominences have not the roundness of those of shagreen, and it has long been known by its proper name of *fish-skin*. The skins of which shagreen is made are not exactly known in this country.

MOROCCO is the skin of a goat, or some other animal resembling it, called *menon*, common in the Levant, dressed with sumach or galls, and colored with any color, much used in upholstery, book-binding, for ladies' shoes, &c. But most of the morocco to be obtained in this country, is prepared here from sheep-skins. The name is derived from the kingdom of Morocco, whence it is supposed the manner of preparing this leather was first borrowed. Morocco is however brought from the Levant, Barbary, Spain, Flanders, and Russia; red, black, yellow, blue, &c.; the methods of preparing which, are too long to be detailed here. The process has been latterly greatly simplified, and the brilliancy and durability of the Turkey red, successfully imitated. The abundance and excellence of the Spanish goat skins, enabled the Spaniards to take the lead in this manufacture; the Russians followed them; but morocco of various colors is now prepared in England equal to any imported.

GLUE, or GELATIN, is a viscid, tenacious matter, soluble in water, and used in the arts as a cement, to bind or connect things together. There are many kinds of glues; as common glue, glove glue, parchment glue. Common glue is used by joiners, cabinet-makers, casemakers, hatters, bookbinders, &c. The consumption of it is very considerable. The best glue is made in England, in square pieces, of a ruddy brown color. Flanders glue is esteemed next to the English. Glue is made of the skins of all kinds of beasts, as oxen, cows, calves, sheep, &c. The older the beast is, the better the glue that is made of its hide. Indeed, it is rare that whole skins are used for this purpose, they being too valuable; but shavings, parings, or scraps of skins, and sometimes the feet, sinews, &c., of beasts are used. Glue made entirely of skins is the best; and that of sinews, &c. the worst; and hence chiefly arises the difference of glues.

*To make glue of parings*, they first steep them two or three days in water, then, washing them well, boil them to the consistence of a black jelly. This done, they pass the jelly while yet hot, through osier baskets, to separate it from any impurities; and in order to purify it still further, they let it rest some time. When the impure matter is precipitated to the bottom of the vessel, it is dissolved and boiled down a second time. It is then poured into flat frames, or moulds, whence it is taken out, when rather hard and solid, and cut into square pieces, or cakes. Nothing now remains but to dry it in the air, on a sort of coarse net, and afterwards to string it, to finish the drying. The glue made of feet, sinews, &c. is managed after the same manner, with this difference only, that they bone and scour the feet, and do not lay them to steep. The surest test of the goodness of glue, besides its clearness and hardness, is, when it dissolves completely in water, without leaving the least sediment. All the glues when pure, are very nutritious as food.

SIZE is less adhesive than glue, and is obtained from parchment sha-

vings, fish-skins, and several animal membranes. It is employed by book-binders, paper-hangers, &c.

FISH GLUE is a sort of glue made of the gelatinous parts of fish. It is of considerable use in refining liquors, in pastry, and various other arts. It is better known by the name of isinglass.

HATS are chiefly made of hair, wool, &c., worked, fulled, and fashioned to the required figure. Hats are said to have been first worn in Europe about the year 1400. They now make a very considerable article of commerce. The finest, and those most valued, are made of the fur of the beaver. They are also made either of the wool or hair of other animals, as the hare, rabbit, camel, goat, lamb, sheep, seal, mole, and of cotton, &c.

The process is much the same in all; and we shall therefore give that with beaver. The skin of this animal is covered with two kinds of hair; the one long, stiff, and glossy; the other short, thick, and soft, which alone is used in hats. When the hair is cut off, the whole is carded with cards, like those used in the woollen manufacture, only finer. The stuff is now laid on the hurdle, which is a square table, having longitudinal chinks cut through it; on this hurdle, with an instrument called a bow, much resembling that of a violin, but larger, the string of which is worked with a little bow-stick, and thus made to play on the hair or wool, it is mixed together, the dust and filth at the same time passing through the chinks. This is considered one of the most difficult operations of hat-making, as upon the proper *bowing* and admixture of the fur, depends greatly the goodness of the hat. The quantity bowed at once is called a *batt*, and never exceeds half of that which is required to make one hat. With this they form gores, or two capades, of an oval shape. They are designedly made thicker in the brim, near the crown, than towards the circumference, or in the crown itself.

The capades or batts being finished, they are reduced into closer and more consistent flakes, by pressing them down with a hardening skin, or leather. This done, they are carried to the basin, a sort of bench with an iron plate fitted therein, having a small fire underneath it; upon which, laying one of the hardened capades, sprinkled over with water, and a sort of mould applied thereon, the heat of the fire, with the water, and pressing, embody the wool into a slight hairy sort of stuff or felt; after which, turning up the edges all round over the mould, they lay it by, and thus proceed with the other. This finished, the two are next joined together, so as to meet in an angle at the top, forming one conical cap. The hat thus basined, is removed to a large trough, resembling a mill-hopper, sloping from the edge to the bottom, which is a kettle, filled with water and grounds of beer, or water rendered sour by sulphuric acid, and kept hot for the purpose. On the sloping side, called the plank, the basined hat, being first dipped in the kettle, is laid. Here it is worked, by rolling and unrolling it again and again, first with the hand and then with a little wooden roller, taking care to dip it from time to time; till at length, by thus felting or thickening it for four or five hours, it is reduced to the extent or dimensions of the hat intended.

After being thus wrought, the proper form is given to it, by laying the conical cap on a wooden block, of the intended size of the crown of the hat, and thus tying it round with a pack-thread, called a comman-

der; after which, with a piece of iron, or copper, bent for the purpose, and called a stamper, they gradually beat or drive the commander all around, till it has reached the bottom of the block, and thus the crown is formed; what remains at bottom below the string being the brim. The hat being now set to dry, they proceed to singe it, by holding it over a flare of straw, or the like; then it is pounced, or rubbed with pumice-stone, to take off the coarser nap; then rubbed over afresh with seal-skin, to lay the nap still finer; and lastly carded with a fine card, to raise the fine down, with which the hat is afterwards to appear. It is then sent upon its block, tied about with pack-thread as before, to be dyed.

The dyer's copper is usually very large, holding ten or twelve dozen hats. The dye, or tincture, is made of logwood, verdigris, sulphate of iron, and alder bark, to which some add galls, sumach, &c. After the hat has been boiled in the coloring liquor about three quarters of an hour, it is taken out and set to cool, and then returned to the dye; and this for ten or twelve times successively. The hat being dyed, is returned to the hatter, who proceeds to dry it, by hanging it up in a suitable stove or oven. When dry, it is stiffened with a solution of glue, or gum-senegal. It is next steamed on a steaming-basin, a little fire-place raised three feet high, with an iron plate laid over it, exactly covering it. On this plate they first spread cloths, which being sprinkled over with water, to secure the hat from burning, the hat is placed, brim downwards, thereon. When moderately hot, the workman strikes gently on the brim, with the flat of his hand, to make the jointings incorporate and bind, so as not to appear; turning it from time to time, and at last setting it on the crown. When steamed sufficiently and dried, it is again put on the block and brushed and ironed on a table called the stall-board. This is done with irons like those commonly used in ironing linen, and heated like them; which being rubbed over each part of the hat, with the assistance of the brush, smoothens and gives it a gloss, which is the last operation.

Hats are distinguished in trade either as *stuff-hats*, those which consist chiefly, if not wholly, of beaver and other fine fur; *plate-hats*, which consist of wool covered with the better material on the outside only; or, *cordies*, made wholly of wool, or other coarse material. *Silk-hats* are also now worn; they are formed of a stout oil case or some such material, and merely covered with silk; these hats are water-proof.

A BUTTON is an article of dress, serving to fasten clothes on the body, and made in various forms of silk, mohair, thread, metal, horn, bone, mother of pearl, wood, &c. Metal buttons, which are now the most common, are formed in two ways, and are either solid metal, or consist of thin plates or caps, bottomed with bone or wood. Metal buttons, properly so called, are either white or yellow, gilded or plaited, and consist of solid metal, generally copper, with more or less alloy of zinc. The tops of such buttons are either cut out of sheet metal, or cast; in the latter case the shanks or eyes are fixed exactly in the centre of each mould, so as to have their extremities immersed in the melted metal, by which means they are firmly fixed in the button when cooled. The former method is used for yellow buttons, the latter for those of white metal. The shanks or eyes of the former kind are made with

great expedition; by a curious engine they are attached to the bottom of each button by a wire clamp, like a pair of sugar tongs; solder is applied, and they become fixed to the button after exposure on a hot iron. The button is then burnished for plating or gilding; the latter is effected by covering the surface with a thin coat of mercury, over which is laid an amalgam of mercury and gold, and the mercury evaporated by heat. Five grains of gold will thus cover 144 buttons, one inch in diameter. Plating or silvering may be performed nearly in the same manner, or with muriate of silver.

*Wrought* or *figured* buttons are made of mohair or silk, and a very inferior kind of thread. In order to make a button, the mohair must be previously wound upon a bobbin, and the mould fixed upon a board, by means of a bodkin thrust through the hole in the middle of it. This being done, the workman warps the mould into three, four, or six columns, according to the button. The moulds of *horse-hair* buttons are covered with a kind of stuff, composed of silk and hair; the warp being belladine silk, and the shoot horse-hair.

*Gold twist buttons* are first covered in the same manner as common buttons. Then the whole is covered with a thin plate of gold or silver. It is afterwards wrought all over with purl, a kind of thread composed of silk and gold wire twisted together, and gold gimp.

*Glass buttons* of different colors are made when the glass is in a state of fusion, the button being nipped out of it by a pair of iron moulds, like those for casting pistol shot; the shank having been inserted in the mould, so that it may be found imbedded in the glass when cool.

*Mother-of pearl buttons* are a somewhat ingenious manufacture. The mode of fixing the eye or shank is by drilling a hole at the back, which is under cut; that is larger at the bottom than at the top, like a mortise, and the shank being driven in by a steady stroke, its extremity expands on striking the bottom of the hole, and thus becomes firmly riveted into the button. Steel studs thus are often riveted into buttons of this and other kinds. In cases where stones and foil are used, the shanks are usually attached with isinglass glue.

GOLD. The method of refining gold, and its application to manufactures, are as follows. In separating the gold, the mineral ore is first broken with iron mallets, then ground in mills to a fine powder, and passed through several sieves. The powder is then placed in troughs, with mercury and water. After this, the water and earth are forced out of the troughs by pouring on a stream of hot water. This done, there remains nothing but the mercury and the ore. The mercury is afterward separated by distillation, and the gold is melted and cast into ingots.

For *refining gold*, either antimony, oxymuriate of mercury, or nitro-muriatic acid, is used. Gold having the property which no other metal has, except platina, of resisting the action of the simple acids, &c., it may be purified by the above agents from all metallic substances, and consequently refined. Another method of purifying gold and silver consists in adding to the alloyed gold and silver a certain quantity of lead, and exposing afterwards this mixture to the action of the fire.

*Gold wire*, as it is called, is most generally made of a cylindrical in-

got of silver, superficially gilt, and afterwards drawn successively through a great number of the holes of the wire drawing iron, each less than the other, till it is sometimes no thicker than the hair of the head. Before the wire is reduced to this excessive fineness, it is drawn through above a hundred and forty different holes; previously to each time of drawing, it is rubbed afresh over with new wax, both to facilitate its passage, and prevent the silver appearing through it.

*Gold thread* or *spun gold*, is flatted gold, wrapped or laid over a thread of silk, by twisting it with a wheel. To dispose the wire to be spun on silk, it is passed between two rollers of a small mill; the gold wire is thus made quite flat, without losing any thing of its gilding, and is rendered so exceedingly thin and flexible, that it is easily spun on silk thread by means of a hand-wheel.

*Gold leaf* is gold beaten with a hammer into exceedingly thin leaves, so that it is computed that an ounce may be beaten into sixteen hundred leaves, each three inches square. That for the gold wire is left much thicker than that for gilding picture frames. The gold is beaten between pieces of skin on a block, commonly of black marble about a foot square. The hammers are of polished iron. The gold is first formed from the ignot to the thickness of a sheet of paper, then it is cut into pieces about an inch square; they are then beaten thinner, and again cut into several smaller pieces.

GILDING is the art of covering a thing over with gold, either in the state of leaf or liquid. The art of gilding was not unknown to the ancients, though it never arrived at the perfection among them to which the moderns have carried it. Pliny assures us, that the first gilding seen at Rome was after the destruction of Carthage, under the censorship of Lucius Mummius, when they began to gild the ceilings of their temples and palaces, the capitol being the first place on which this enrichment was bestowed. But he adds, that luxury advanced on them so hastily, that in a little time you might see all, even private and poor persons, gild the very walls, vaults, &c. of their houses. Modern gilders make use of gold leaves of various thicknesses; but there are some so fine, that a thousand do not weigh above four or five drachms. The thickest are used for gilding on iron, and other metals; and the thinnest on wood.

A color of gold is given by painting and varnishes, without employing gold, but this is a false kind of gilding. Thus a very fine golden color is given to brass and silver, by applying upon these metals a gold colored varnish, which being transparent, shows all the brilliancy of the metals beneath. Many ornaments of brass are varnished in this manner which is called GOLD LACQUERING, to distinguish them from those which are really gilt. Silver leaves thus varnished are put upon leather, which is then called *gilt* leather. Among the false gilding may be also reckoned that which is done with thin leaves of copper or brass, called *Dutch leaf*. In this manner are made most kinds of what is called *gilt paper*.

The gold intended for gilding, ought, in general, to be beaten into thin leaves, or otherwise divided into very fine parts. As metals cannot adhere well merely by contact to any but other metallic substances, when gold is to be applied to the surface of some non-metallic body,

this surface must previously be covered with some gluey and tenacious substance, by which the gold must be made to adhere. Such substances are in general called SIZES, some of which are made of vegetable and animal glues, and others of oily, gluey, and drying matters. Upon them the leaves of gold are applied, and pressed down with a little cotton, or a hare's foot; and when the whole is dry, the work is to be finished, polished or burnished with a hard instrument, called a *dog's tooth*, to give it lustre.

The method of applying gold upon metals is entirely different. The surface of the metal to be gilt is first to be cleaned; and then leaves are to be applied to it, which, by means of rubbing with a polished blood-stone, or pumice-stone, are made to adhere perfectly well. In this manner, silver leaf is fixed and burnished upon brass in the making of what is called *French plate;* and sometimes also, gold leaf is burnished upon copper and iron. Gold is applied to metals in several other manners. One of these is previously forming the gold into a paste or amalgam with mercury, with which the surface of the metal to be gilded must be covered; then a sufficient heat is applied to evaporate the mercury; and the gold which is left on the surface of the copper, is lastly burnished with a blood-stone.

Some metals, particularly silver, may be gilt in the following manner.—Let gold be dissolved in nitro-muriatic acid. In this solution pieces of linen are dipped, and burnt to black ashes. These ashes being rubbed on the surface of the silver by means of a wet linen rag, apply the particles of gold which they contain, and which, by this method, adhere very well. The remaining part of the ashes is washed off; and the surface of the silver, which in this state does not seem to be gilt, is burnished with a blood-stone till it acquires a fine color of gold. This method of gilding is very easy, and consumes a very small quantity of gold. Most gilt ornaments upon fans, snuff-boxes, and other toys of much show and little value, are nothing but silver, gilt in this manner. Gold may also be applied to glass, porcelain, and other vitrified matters. After the gold leaf is laid on the glass, &c. the pieces are exposed to a certain degree of heat, and burnished slightly to give them a lustre. A more substantial gilding is fixed upon glass, enamel, and porcelain, by applying to these substances powder of gold mixed with a solution of gum arabic, or with some essential oil, and a small quantity of borax; after which a sufficient heat is applied to soften the glass and the gold, which is then burnished. With this mixture, any figures may be drawn. The powders for this purpose may be made,—1. By grinding gold leaf with honey, which is afterwards to be washed away with water. 2. By distilling to dryness a solution of gold in nitro-muriatic acid. 3. By evaporating the mercury from an amalgam of gold, taking care to stir well the mass near the end of the process. 4. By precipitating gold from its solution in nitro-muriatic acid, by applying to it a solution of green vitriol in water, or copper, and perhaps other metallic substances.

SILVERING. Wood, paper, &c. are silvered in the same manner as gilding is performed, using only silver leaf instead of gold. For common purposes, copper or brass may be plated by dissolving silver in nitric acid, neutralizing the acid with alkali, and rubbing the polished surface of the article with this mixture, till it assumes a white sil-

ver color, which will continue for some time, if not exposed to much friction. Dial plates of clocks, barometers, &c. are plated with old silver lace dissolved in nitric acid, and then precipitated with common salt: this precipitate is mixed with carbonate of potash and whiting, until it forms a dry mass, with which the metal to be plated is rubbed. The most permanent plating, however, is performed in the following manner:—Take two thin plates of silver and copper, the former in the proportion of one to twelve of the latter; put a little powdered borax between them, and expose them to a white heat, when the silver will be found firmly united to the copper, after which it is passed between rollers, till it has acquired the proper thickness for the manufacture intended.

COINING is the art or act of making money. Coining is either performed by the hammer or the mill. The first method is now little used in Europe, although it was the only one known until the year 1553, when a new coining mill was invented by Anthony Brucher; and first tried in the French king's palace at Paris, for coining counters. In either kind of coining, the pieces of metal are stamped or struck with a kind of moulds or dies, wherein is engraven the device fixed upon. The first operations in coining, are mixing and melting the metal; for there are no species of money coined of pure gold or silver, but always with a certain quantity of alloy of copper, or other metals mixed with them; the reasons are, partly the necessity of making those metals harder, by some foreign admixture, and partly to defray the expenses of coining. Melting, if the metal be gold, is performed in earthen crucibles; if silver or copper, in iron ones. When the gold or silver is melted, it is poured into moulds for casting into plates or sheets; the method of doing this is exactly the same as that used by the founders in sand.

*Coining by the Mill.* The plates being taken out of the moulds, scraped and brushed, are passed several times through the mill, to flatten them, and bring them to the just thickness of the particular species to be coined; with this difference, however, that the plates of gold are heated again in the furnace, and quenched in water, before they undergo the mill; which softens and renders them more ductile; whereas those of silver pass the mill just as they are, without any heating; and when afterwards they are heated, they are left to cool of themselves, without water. The plates, whether gold, silver, or copper, thus reduced as nearly as possible to their thickness, are cut into round pieces, nearly the size of the intended species; these pieces are adjusted, and brought by filing or rasping, to the weight of the standard, whereby they are to be regulated; and what remains of the plate between the circles is melted again. The pieces are adjusted in a fine balance; and those which prove too light are separated from those too heavy; the first to be melted again, and the second to be filed down; for the mill through which the plates are passed, can never be so just but there will be some inequality. They are then carried to the blanching or whitening house, i. e. the place where the gold pieces have their color given them, and the silver ones are whitened; which is done by heating them in the furnace, and afterwards boiling them successively in two copper vessels, with water, common salt and tartar. After scouring them

well with sand, and washing them with common water, they are dried over a wood fire in a copper sieve. They formerly were next marked with an engine on the edges, to prevent the clipping and paring of the specie; but latterly, the edges and faces of the money are struck at once. This marking of the edges is called *milling*. Some of the larger pieces, as crowns, have legends impressed on the edge. A new method of coining has been introduced by Messrs. Bolton and Watt, which is now the only mode used in England. For this purpose, buildings are erected on Tower Hill. The machinery invented by these able mechanics has been long used in the manufacture of copper money. A steam engine works the screw presses for cutting out the circular pieces of copper, and coins both the edges and faces of the money at the same time, with such superior excellence and cheapness of workmanship, as will prevent clandestine imitation. By this machinery, four boys are capable of striking 30,000 pieces of money in an hour; and the machine acts at the same time as a register, and keeps an unerring account of the number of pieces struck. These having now all their marks and impressions, both on the edges and faces, become money; but have not currency till they have been weighed and examined.

*For the coining of Medals* the process is the same in effect with that of money; the principal difference consists in this, that money, having but a small relievo, receives its impression at a single stroke; whereas for medals, the height of their relievo makes it necessary that the stroke be repeated several times. Medallions, and medals of high relievo, from the difficulty of stamping them in the press, are usually first cast or moulded in sand, like other works of that kind, and are only put into the press to perfect them.

PLUMBERY is the art of casting, preparing, and working lead; and using it in building, &c. The lead used in plumbery is furnished from the lead works in large ingots, or blocks, called pigs of lead, each weighing generally about 100 pounds. Lead melting very easily, is used for figures of any kind, by running it into moulds of brass, clay, plaster, &c. But the chief articles in plumbery are sheets and pipes of lead. These constitute the basis of the plumber's work in building; the following is the process:—

*For casting large sheets of lead.* The lead is melted in a large caldron or furnace; near the furnace is a table or mould, whereon the lead is to be cast. Around it runs a frame, consisting of a ledge or border of wood four or five inches high from the table. The table is covered with fine, moist, smooth sand. At the end of the table nearest to the furnace, is adapted a box equal in length to the width of the table; at the bottom of the box is a horizontal slit, to let out the melted metal; the box moves upon rollers along the edges of the projecting rim of the table, and is set in motion by ropes and pulleys properly attached. The box is made to contain as much lead as will cast the whole sheet at the same time; and the slit in the bottom is adjusted so as to permit the proper quantity of lead to run out during its progress over the table. The lead is taken out of the caldron with an iron ladle. Over the the table is a strike or rake of wood, which bears and plays on the edges of the frame; and so placed as that between it and the sand, is a

space proportionable to the intended thickness of the sheet. The use of this strike is to drive the matter, while yet liquid, to the extremity of the mould, and give the sheet an equal thickness. The sheets thus cast, there remains nothing but to edge them, in order to render them smooth and straight.

This is called *cast lead*. *Milled lead* is not made by the plumber, but at the lead works; in the operation of making it, a roller or *flatting mill* is used, whence its name. Milled lead is a slighter article than cast lead. *Sheet lead* is of different thicknesses, varying in its weight from 5 to 9 lbs. in each square foot.

*For casting thin sheets of lead.* The table or mould here used is of a length and breadth at discretion. Instead of sand, it is covered with a piece of woollen stuff, nailed down at both ends to keep it tight; and over this is laid a very fine linen cloth. These fine smooth sheets of lead are sometimes used between the joints of large stones in great buildings, &c.

TIN. The mineral ore being taken from the mine, is broken into pieces with large iron mallets; then brought to a stamping mill, where it is beaten still smaller, and the water passing through, washes away the earthy parts, leaving the metallic ones behind. It is then dried in a furnace on iron plates, and ground fine, washed and dried again, and in this state is called *black tin*. To convert it into white tin, i. e. pure tin, they carry it to a furnace, where it is melted, and ultimately cast into large oblong square masses, called *blocks*.

*Tin plate* is iron plated over with tin.

FOUNDRY is the art of melting and casting all sorts of metals; particularly brass, iron, bell-metal, &c. The word is also used for a place or house furnished with furnaces, or forges.

*Foundry of small works, or casting in sand.* The sand used by the founders, in casting brass, &c., is yellowish, rather soft, and greasy; but after it has been used, becomes quite black, from the charcoal dust used in the moulds. With this sand, a mould is made of dimensions suitable for the things to be cast; wood or metallic patterns are then placed on the mould and pressed down into the sand, so as to leave their form indented. Along the middle of the mould is laid half a little cylinder of brass, which is to be the chief conduit, funnel, or canal, for running the metal; being so disposed as to touch the ledge at one side, and only reach the last pattern on the other. From this are placed several smaller conduits or funnels, reaching to each pattern, whereby the metal is conveyed through the whole frame. After the same manner, they proceed to work the counter part, or other half of the mould, with the same patterns, in a frame exactly like the former; excepting that it has pins, which entering holes corresponding thereto in the other, make, when the two or joined together, the two cavities of the pattern fall exactly on each other. When both parts of the mould are sufficiently dried, they are joined together by means of pins; and to prevent their starting or slipping aside by the force of the metal, which is poured in a melted state, through a hole contrived as the chief conduit, they are locked in a kind of press. The moulds thus secured in the press, are ranged near the furnace, to be in readiness to receive the metal as it comes out of

the crucible. While the moulds are preparing, the metal is fused in an earthen crucible, in a furnace adapted to the crucible, so that the fire may completely envelope it. The founder now takes the crucible out of the fire with a pair of iron tongs, and carries it to the mould, into which he pours the fluid metal. Thus he goes successively from one to another, till his crucible is emptied. When sufficiently cool, the mould is opened, the cast matter taken out, and the sand and moulds applied again to other castings.

*In casting statues, figures, busts, &c.* there are three things chiefly required, viz. *the mould*, *wax*, and *core*.

*In casting bells*, the metal is different; there being, in *bronze*, or the metal of statues, from nine to twelve parts tin to 100 of copper, whereas bell metal is generally composed of three parts copper and one tin. The mirrors for telescopes consist chiefly of two parts copper and one tin, with smaller portions of brass, silver, and arsenic. The dimensions of the core and the wax of bells are not left to chance or the caprice of the workman, but must be measured on a kind of scale, which gives the height, aperture and thickness necessary for the several tones required. It is on the wax also that the several mouldings, and other ornaments and inscriptions to be represented in relievo on the outside of the bell, are formed. The clapper, or tongue, is not properly a part of the bell, but furnished from other hands. In Europe it is usually of iron, and is suspended in the middle of the bell. In China, it is only a huge wooden mallet, struck by force of arm against the bell; whence they can have but little of that consonancy, so much admired in some of our rings of bells.

*Bells* have been cast in China of an enormous weight; some at Pekin are said to weigh 120,000 lbs. each; one at Nankin weighs 50,000 lbs. Few European bells can compete with these. One at Erfurt, in Saxony, weighs 25,400 lbs.; another at Rouen, in France, weighs 35,000 lbs.; the bells of England sink into comparative insignificance after those. One at Oxford weighs 17,000 lbs.; the great bell of St. Paul's, London, weighs only 11,474 lbs.; and Tom of Lincoln, 10,854 lbs. But, if the testimony of some authors may be relied on, two bells at Moscow far exceed all others in size; one is said to weigh 288,000 lbs.; and the other, the enormous weight of 432,000 lbs.; its height is said to be 19 feet, its circumference at the bottom 21 yards, and its greatest thickness 23 inches.

The casting of *cannon*, *mortars*, and other pieces of *artillery*, is performed like that of statues and bells, as to what regards the mould, furnaces, &c. Cannon are made of a mixture of brass, copper and tin, or of cast iron, but more commonly with the last. A cannon is always shaped a little conical, being thickest of metal at the breech, where the greatest effort of the gunpowder is made, and diminishing thence to the muzzle; so that if the mouth be two inches thick of metal, the breech is six. Its length is measured in calibres, i. e. in diameters of the muzzle. Six inches at the muzzle require twenty calibres, or ten feet in length; there is about one-sixth of an inch allowed as play for the ball. The guns are cast without any core, and afterwards bored with a steel trepan, that is worked either by horses, a water-mill, or steam.

There is a large iron foundry two miles from Falkirk, in Scotland, called *Carron Works.* Above 100 acres of land have been converted into reservoirs and pools of water, diverted from the river by magnificent dams built about two miles above the works, which, after turning eighteen large wheels, falls into a tide navigation, that conveys their castings to the sea. These works are the greatest of the kind in Europe, and were established in 1760. At present the buildings are of vast extent; and the machinery is the first in Britain both in elegance and correctness. There are 1600 men employed, who receive weekly £650 sterling, which has greatly enriched the adjoining country; 6500 tons of iron are melted annually from the mineral, and cast into cannon, cylinders, &c. In the founding of cannon these works have lately arrived at such perfection, that they make above 5000 pieces a year; and their iron guns of the *new construction* are the lightest and neatest now in use, not excepting brass guns.

The words *Crucible* and *Forge*, having been repeatedly used, it may be proper to describe them. A crucible is a vessel commonly made of earth, sometimes of iron, plumbago, platina, &c., without any handle; considerably higher than wide; sometimes triangular, sometimes round at top, which is the widest part, and assuming a circular figure below; in which chemists, coiners, goldsmiths, and other artificers, melt gold, silver, &c. Earthen crucibles are made of potter's clay, and hold from one ounce to 800; the iron ones are larger, some holding 10,000 ounces. Forge signifies a kind of small furnace, wherein smiths and other artificers heat their metals. The word *forge* is also used for a large furnace, wherein iron ore, taken out of the mine, is melted down, though this is not so properly a forge as a furnace. A forge is more properly used for another kind of furnace, wherein pigs of metal are heated, fused, beaten with large hammers, and thus rendered soft, ductile, and fit for use. Of these forges there are two kinds, through which the iron successively passes, before it comes to the smith. *Forge-Mills* are turned by water, which serves to raise and let fall one or more huge hammers, to beat and form the iron into bars, anchors, and other massive works.

In LETTER-FOUNDRY, or *the casting of printing letters,* two things are principally to be regarded—the *matter* and the *matrices.* The *matter*, or type metal is composed of lead, alloyed with a small portion of antimony. Every letter founder preparing his own metal, the proportions of lead and antimony are as various as the founders differ in skill and experience. The excellence of type metal consists in hardness, tenacity, and stiffness; hard, that the face of the type may not be disfigured with a slight blow, that may endure a considerable wear; tenacious, that it may not be too easily broken; and stiff, that the types may not be bent from their rectilinear position.

The *matrices* of the letters are pieces of copper or brass, whereon the impression of the intended character has been cut, or struck in a cavity by means of punches. Each letter has its proper matrice; and there are particular ones for points, figures, rules, head-pieces, and other ornaments of printing excepting the quadrats, which being only of lead, and not intended to leave any impression, are cast without matrices, and only in moulds. Each matrice has its punch made of steel, or iron well tempered. The matrices being struck, and touched up, or repaired

when needful, are put at the end of an iron mould, enclosed between two thin pieces of board. Every thing belonging to the mould, being disposed, they begin to prepare the matter. The furnace, whereon the basin is placed for the metal to be melted in, is made of the same matter as crucibles. Over the furnace is placed the melting basin, or copper, which is divided into two equal parts by a perpendicular partition. This basin contains the melted type metal. One workman is employed at each furnace. To run the metal into the mould, the founder holds in his ladle just enough for one letter. Having filled the ladle with liquid metal, he pours it through a jet or funnel into the matrice or character. He then opens the mould, and takes out the character, and without loss of time, shuts it again, replaces the matrice, and casts a new letter. It is incredible with what expedition all this is done; an expert workman being able to cast 3000 letters in a day. The letter being cast, it is examined to ascertain whether it is perfect; if it be not, it is thrown among the refuse of the fount. When letters, are cast, they remain to be justified, both as to thickness and height. The justification of the height is guided by the *m* of some body of characters already justified. All that remains is to dress the letters, and make that sort of groove which every letter has in its bottom, in order that it may stand perpendicular. This is performed by turning a long line of them upside down, between two cheeks of wood, which, pressing very tight, enable the workman to run his plane along the line of letters so inverted, and thus to form the groove. The letters are now fit for the printer's use. The perfection of letters thus cast, consists of their being all square and straight on every side, of the same height, evenly lined, well grooved, &c. An inspection of the letters themselves will assist the reader in understanding this description, and afford a clearer idea than can be otherwise conceived.

FOUNT or FONT, among printers, is a set or quantity of characters, or letters of each kind, cast by the letter founder and sorted. We say a founder has cast a fount of pica, of english, pearl, &c. meaning he has cast a set of characters of these kinds. A complete fount includes capitals, small capitals, little letters, called lower case, double letters, accented letters, figures, points, characters for reference, spaces, and quadrats. The letter founders have a kind of list, by which they regulate their founts. Some letters being much more used than others, it is necessary to have more of them cast than of those which occur less frequently. Thus the *o* and *i*, for instance, are always in greater quantity than the *k* or *z*. In a fount, or bill, of the size called pica, weighing in all 800 pounds, the number of the letter *e*, is 12,000; of *t*, 9,000; of *a*, 8,500; of *i*, *n*, *o*, and *s*, 8,000 each; of *c*, there are 3,000; of *b*, 1,600; *k* 800; *x* 400; *z* 200. This is for the English language. In other languages, the comparative frequency must be different.

SIZES. Different names are given to the various sizes of types, of which the following are most employed in common book printing.

*Pica.*—abcdefghijklmnopqrstuvwxyz&.
*Small Pica.*—abcdefghijklmnopqrstuvwxyz&.
*Long Primer.*—abcdefghijklmnopqrstuvwxyz&.

PRINTING.

*Bourgeois.*—abcdefghijklmnopqrstuvwxyz&.

*Brevier.*—abcdefghijklmnopqrstuvwxyz&.

*Minion.*—abcdefghijklmnopqrstuvwxyz&.

*Nonpariel.*—abcdefghijklmnopqrstuvwxyz&.

PRINTING, is the art of making an impression upon one body by pressing it with another. This art, in some way or other, has been known in all ages. It has been done upon wax, plaster and iron, by the ancients; their seals, rings, and money prove it. It has been done with wooden blocks upon cotton and silk by the Indians. Printing therefore, in this unlimited sense, was common to all nations. This art is now divided into four distinct branches. Common, or letter press printing; rolling press printing; calico printing; and stereotype printing.

*Letter press printing* is the most useful and curious branch of the art. To this are chiefly owing our deliverance from ignorance and error, the progress of learning, the revival of sciences, many of the modern inventions and discoveries, and numberless improvements in the arts, which without this noble invention, would have been either lost to mankind, or confined to the knowledge of a few.

*History of Printing.*—The honor of having given existence to the present method of printing has been claimed by the cities of Haerlem, Mentz, and Strasburg; and to each of these it may be applied in a qualified sense, as they severally made many improvements upon one another in the art. But the origin, however, of printing, was at Haerlem; the first book was printed in the year 1430; and to Lawrence Coster, of that city, is this discovery to be ascribed; although there is no doubt, that soon after, Guttemberg, as well as Fust and Schoeffer, who invented *metal* types, the first types being of *wood*, all added materially to the perfection of this important discovery. It is said, indeed, that Guttemberg invented *moveable* types, and that he began his experiments at Strasburg, and completed them at Mentz; it is also said that Coster's method was to cut out the letters upon a wooden block; that he took for apprentice John Fust or Faustus, and bound him to secrecy, but that Fust notwithstanding his oath, went off, not only with the knowledge of the art, but with the types and all the implements of his master: first to Amsterdam, thence to Cologne, and afterwards to Mentz. Here, assisted by Schoeffer, they printed a number of Bibles in imitation of manuscript, and Fust carried them to Paris for sale. The Parisians were astonished at their exact similarity, and accused Fust of some diabolical art; hence the origin of the story of the Devil and Dr. Faustus. Wooden types not being found sufficiently durable, and not answering expectations in other respects, it caused the first invention of *cut metal types.* The honor of completing the discovery is therefore due to Peter Schoeffer, who found out the method of forming the characters in a matrice, that the letters might be cast singly, instead of being cut. He privately cut matrices for the whole alphabet; and when he showed his master Fust, who appears to have assisted Guttemberg in his attempts to bring the art to perfection, the letters cast from these matrices, Fust was so pleased with the contrivance, that he promised to Peter his only daughter in marriage; a promise which he soon after performed. Fust and Schoeffer concealed this new improvement,

by administering an oath of secrecy to all whom they entrusted, till the year 1462, when, by the dispersion of their servants into different countries, at the sacking of Mentz, by the Archbishop Adolphus, the invention was publicly divulged.

*Introduction of Printing into Britain.* Printing was practised at Rome, in the year 1467, and the year following, it was introduced into England by Thomas Bourchier, Archbishop of Canterbury, who sent W. Turner, Master of the Robes, and W. Caxton, merchant, to the continent to learn the art. While there, they met with one Corsellis, an under workman, whom they induced to come to England. This being accomplished, a press was set up at Oxford, and the first book printed in England in 1468, by Corsellis. Oxford was afterwards found inconvenient to be the sole printing place in England, as being too far from London and the sea. The king, therefore, set up a press at St. Alban's and another in the city of Westminster, where several books of divinity and physic were printed. By this means, the art grew famous. But although Caxton has been heretofore considered the first printer in England, it is now clear that that honor must be conceded to Corsellis, yet Caxton was the first in England that used *fusile types*, and consequently, the first that brought the art to comparative perfection; whereas, it is said that Corsellis printed with separate cut types, in *wood*, being the only method which he had learned at Haerlem. Caxton's printing office was in the Abbey of Westminster: he pursued his business with extraordinary diligence, till 1494, in which year he died very old.

*History of printing in the United States.*—The first printing in New England, was done in 1639, by one Day—the proprietor of the press was a clergyman by the name of Glover, who died on his passage to America. The first thing printed was the Freeman's oath, the second, an Almanac, and the third, an edition of the Psalms. No other printing press was established in America, until near the close of the seventeenth century. John Elliot, the celebrated missionary, having translated the Bible into the Indian language, had it printed at Cambridge, by means of this press, in 1664.

The first newspaper in North America, called *The Boston Weekly News-Letter*, was established in 1704. About the middle of the 18th century, ten other printing presses were established—four in New England; two in New York; two in Pennsylvania; one in South Carolina; and one in Maryland. The number of books published at this time was also considerable, although they were executed in a coarse style, and were generally books of devotion, or for the purposes of education.

As to the *method of printing*, we shall only observe that the types, or letters are distributed, each kind by itself, in cases. The compositor, placing the copy of the work before him, picks up letter by letter, and arranges them in order to form words and sentences, till he has composed a page, and so on for the whole work; the degree of expedition and despatch with which this is carried on, is not easily to be conceived. The instrument in which the letters are set, is called a *composing stick*. When full, the compositor empties it on a thin board, called a *galley*, till he has composed a page. When a certain number of pages are com-

pleted, they are firmly placed in due order, in a *chase*, which is a rectangular iron frame. In this condition, the work is called a *form*: and the next thing is to work it off at the *printing-press*. This press is a very complex machine; its two principal parts are the body of the press, which serves to give the weight or stroke for the impression, and the carriage on which the form is laid.

The wonderful power of the steam engine has lately been applied to work the printing press, and two different machines have been invented for the purpose, by means of which, three boys can perform in one hour, the work that in the usual way would employ two men eight hours. One of the boys lays the paper on the machine, which of itself distributes the ink on the forms, and prints first one side of the sheet and then the other; the second boy removes the sheets thus printed: and the third boy lays them evenly on the bank. In this way a thousand sheets are printed in an hour. The press is of the rolling kind. Several of the daily newspapers are now printed by steam, as well indeed as many valuable books.

Stereotype printing, although on a principle which was anterior to printing by moveable types, was invented in Scotland by Mr. Ged and Mr. Tilloch respectively, carried to France, and at a subsequent date, was introduced into England. It has arrived at great perfection in the United States, within a few years.

*The mode of Stereotype printing* is first to set up a page in the common way, with moveable types; and when correct, a cast of plaster of Paris is taken from it; in this cast, the metal for the stereotype is poured; and so for every page intended to be stereotyped, each page thus forming a single block or plate. When the plates are prepared, they are printed off like other works; if by a rolling press, the plates are bent to suit the rotundity of the cylinder. But it is only for standard books of very extensive circulation and constant demand, and wherein no material additions, corrections, or alterations, as to plan, or size, are wanted, that the stereotype can be used to advantage. Such works are comparatively very few. It is true, the stereotype plates can be, and occasionally are, altered, by punching out words or letters, and inserting others; but the trouble of doing this is great, and of course, expensive.

The *Ink* used in printing is composed of nut or linseed oil, boiled and purified: with this oil are mixed common resin, to give it tenacity, and soap, to destroy the greasiness of the oil, and make the ink easily wash off: these ingredients varying in proportions according to the experience of the ink-maker, are ground up with a quantity of lamp-black. For red ink, vermillion is used instead of lamp-black.

*Books are printed in China*, from wooden blocks, cut like those used in printing calico, paper, &c. among us. These blocks are made of a smooth, firm wood, and of the size of the leaf required; upon the face side, some able penman draws out the several letters with a kind of pencil; when finished, the block is cut by the sculptor, with his sharp small instruments, which make all the characters appear in relievo on the wood. Their *paper* is inferior to ours in color. It is made of the inner bark or rind of a kind of rushes, beaten up with water into a pulp or paste, and formed in moulds much like ours. The advantage

of the Chinese printing consists in this, that they are not obliged to take off the whole edition at once, but print their books as they need them. Their blocks are easily re-touched and made to serve again, and there needs no corrector of the press. Its disadvantages are, that a large room will scarcely hold all the blocks of a moderate volume: the color of their ink easily fades; and their paper is too thin, apt to tear, and subject to worms, whence it is that we see so few ancient books in China.

*Rolling Press Printing* is employed in taking off prints or impressions from copper plates, engraven or etched: an account of which shall appear under the article Engraving.

VARNISH is a thick, glossy liquor, used by painters, gilders, and other artificers, to give a gloss and lustre to their works, and also to defend them from the weather. There are several kinds of varnish, which are divided into two classes, spirit and oil varnishes. The finest of the former class is the copal varnish, made of gum copal dissolved in spirit of wine, or essential oils. Shell lac, and the other gum resins are next. The *white varnish* is made of oil of turpentine, fine turpentine, and mastic. The *transparent varnish*, used for window blinds, is made of mastic dissolved alone, or with the addition of Canada balsam, in oil of turpentine. *Drying varnish* is made of oil, turpentine, and sandrac, melted together. The *common varnish* is only yellow or black resin dissolved in oil of turpentine. The word varnish is used also for the glossy coat wherewith potter's ware, China ware, &c., are covered, to give them a lustre; but the common term, *glaze*, is more proper, as it is in reality a glass. This will be noticed under Pottery.

JAPANNING is the art of varnishing and drawing figures on wood, in the same manner as is done by the natives of Japan. The substances which admit of being japanned, are almost every kind that are dry and rigid, or not too flexible or extensible; as wood, metals, leather, and prepared paper. Wood and metals do not require any other preparation, but to have their surface perfectly even and clean; but leather should be securely strained, either on frames or boards, as its bending or forming folds would otherwise crack and force off the coats of varnish; the paper should be treated in the same manner, and have a previous strong coat of size; but it is rarely made the subject of japanning, till it is converted into *papier mache'*, that is, reduced to a pulp, mixed with gum and size, and dried to hardness, or wrought by other means into such form, that its original state, particularly with respect to flexibility, is lost.

BRICKS are formed by means of a wooden mould, dried in the open air, and then baked or burnt, to serve the purposes of building. The first step in the process of brick making is casting the clay. The next step is to tread or temper it. This is commonly done by means of oxen, who are employed to tread it. The goodness of brick depends chiefly upon this preparation. The clay itself, before it is wrought is generally brittle, but by working and incorporating it together with water, the whole becomes a homogeneous paste. Bricks are commonly of a red color. Bricks may be made of any clayey earth that is clear of stones, but all will not burn red. The clay ought to be dug before winter, but not made into bricks before spring.

Bricks are burnt either in a *kiln* or *clamp*. Those in a kiln are burnt either with wood or coal, as may suit the particular convenience of the spot for obtaining most readily one or the other material; and as the fire can be, in kilns, continued at the pleasure of the superintendent, the bricks can be more equally and uniformly burnt. About London, however, bricks are chiefly burnt in *clamps*, built of the bricks themselves, after the manner of arching in kilns, with a vacancy between every two bricks for the fire to play through; but with this difference, they span it over by making the bricks project one over another on both sides of the place, for the wood and coal to lie in till they meet, and are bounded by the bricks at the top, which close all up. The place for the fuel is carried up straight on both sides, till about three feet high; then they almost fill it with wood, and over that lay a covering of coal. They also strew coal over the clamp, upon every row of bricks, which are packed loosely, so that the fire may more readily communicate with each row; and lastly they kindle the wood, which gives fire to the coal; when all is consumed, they conclude the bricks are sufficiently burnt.

TILE is a sort of thin laminated brick, used for the roofs of houses; or, more properly, a fat, clayey earth, moulded in a certain form, and dried and burnt like bricks. Tiles are made of better clay than bricks. The method of burning is similar to brick, but tiles are always burnt in kilns. There are various kinds of tiles for building; but *hollow* and *plain* tiles are the chief. *Dutch tiles*, or as they are sometimes called, Flemish tiles, are of two kinds, ancient and modern. The ancient, for chimney foot pieces; they were painted with ancient figures and moresque devices, but came short, both as to the design and coloring, of the modern ones. The more *modern* Dutch tiles are commonly used, plastered up in the jambs of chimneys, and are much better glazed and painted than the former kind. But these seem to be made of the same white clay of which glazed earthen ware is made. Both these are now fallen into disuse. The *blue slate*, used to cover houses, are sometimes called tiles.

A PIPE is a well known machine, used in smoking tobacco, consisting of a long slender tube, made of clay. Pipes are of various fashions, as long, short, plain, worked, white, varnished, unvarnished, and of various colors, &c. The Turks use pipes three or four feet long, made of rushes, or wood bored; at the end of which they fix a kind of nut of baked earth, which serves as a bowl, and which they take off after smoking. The clay with which pipes are made is brought to the makers in lumps of six or eight inches square. When used, it is thrown into a large pan, moistened with water, and beaten and moulded till it is soft and mellow, and exceedingly well tempered. Thence it is removed to the rolling board, where the workman readily breaks off an exact quantity for a couple of pipes, rolls out both at once, one in each hand, to the proper length and form, leaving a sufficient quantity at one end for the bowl; then lays them on a board by dozens, where they remain till they have acquired a greater degree of hardness. The tube is then formed by running a wire through the clay. The pipe, before the wire is withdrawn, is closed in a mould of polished iron, and now, by the help of another machine, the bowl instantly receives its form, and the whole pipe is returned in its exact figure. It is now again left to

harden yet more, before it undergoes its last smoothing and finish, which is quickly done by a kind of knife, &c., and thence it is taken to the kiln.

The *kilns* are of various sizes; some hold twenty gross, others eighty, and even a hundred; but the more usual size contains forty or fifty gross of pipes. Here they are six or eight hours exposed to a strong clear fire. This brings them to their state of whiteness; and is the last operation. They are then taken and packed up in boxes for sale.

POTTERY is the art of making earthen pots or vessels; or the manufacture of earthen ware. The clay used for this purpose, is a soft, viscous earth, of different kinds and properties, and may be found in various places. The better kinds of *English stone ware* are composed of *pipe clay* and *pounded flints*, in the proportion of four parts of flints to eighteen parts of clay. The *yellowish white* or *queen's ware*, so generally in use, is made of the same materials, with large proportions of clay. The *common red earthen ware* appears to be merely common clay, similar to that with which bricks are made. The first is *glazed*, by throwing sea-salt into the furnace in which it is baked, when the heat is strong: the salt is converted into vapor, and this being applied to the surface of the stone-ware, vitrifies it, and forms an excellent glazing. The *queen's ware* is *glazed* by dipping the baked ware into a mixture of the consistence of cream, composed of white lead, ground flint, and ground glass, and submitting the ware afterwards to heat. The composition is, however sometimes varied. But the glaze for most of our common earthen ware containing too large a portion of lead, such vessels should never be employed for acid liquors of any kind, as the acid will dissolve the lead, and thus render whatever is contained in the vessel *poisonous*.

Among the instruments used in pottery, the *wheel* and *lathe* are the principal; the first for large works, the second for small. The potter's wheel consists principally in its *nut*, which is its beam or axis, the pivot of which plays perpendicularly on a free-stone sole at the bottom. From the four corners of this beam proceed four iron bars, which, forming diagonal lines with the beam, descend and are fastened at bottom to a strong wooden circle. On the top of the nut is laid a piece of the clay to be formed and fashioned. The wheel, thus disposed, is encompassed on all sides with four different pieces of wood, sustained on a wooden frame. The hind piece, which is that whereon the workman sits, is made a little inclining towards the wheel. On the fore pieces is placed the prepared clay; by the workman's side is a trough of water, wherewith, from time to time, he wets his hands, to prevent the clay's sticking to them. The potter having prepared his clay, and laid a piece of it, suitable to the work he intends, on the top of the beam, turns the wheel till it has got the proper velocity; forming the cavity of the vessel, and widening till it has received its intended form. When the vessel is found to be too thick, he pares off what is redundant with an instrument. When the vessel is finished, he takes it off the circular head by a wire passed underneath the vessel.

The potter's *lathe* is also a kind of wheel, but simpler and slighter than the former. Its three principal parts are an iron beam or axis, placed perpendicularly; a small wooden wheel, placed horizontally at

the top of the beam, and serving to form the vessel on; and a thick wooden wheel placed horizontally at the bottom. The potters work with the lathe with the same instruments, and after the same manner, as with the wheel. The lathe and wheel serve only to give the form of the body of the vessel; the feet, handles and other occasional ornaments, are made and set by hand. If there be any sculpture in the work, it is usually done in earthen or wooden moulds, and afterwards stuck on the outside of the vessel.

DELFT-WARE is a kind of pottery of baked earth, covered with an enamel, or white glazing, which gives it the appearance of porcelain. It is sometimes ornamented with paintings of figures, &c. The basis of this pottery is clay, which is mixed in such quantity as to produce enough ductility to be worked, moulded, and turned easily, without cracking or shrinking too much in drying or baking. The vessels, being slightly baked, are covered with an enamel or glazing. They are then painted with colors composed of metallic oxides, mixed and ground with fusible glass. When dry they are again baked, and exposed to a heat capable of fusing the enamel, and completing the baking.—The furnace and colors used for painting this ware, are the same as for porcelain. For making these *enamels* there are many recipes, but all of them are composed of sand and flints, vitrifiable salts, and oxide of lead or tin. The sand must be perfectly vitrified, so as to form a gloss considerably fusible. The kinds of clay chiefly used for delft-ware are blue and green; to give it a greater solidity, some red clay is added; which on account of its ferruginous matter, possesses the requisite binding quality. Three parts blue clay, two red, and five marl, form the composition used in several manufactures.

PORCELAIN, or CHINA, as it is commonly called, because formerly brought chiefly from that country, is imported occasionally into Europe from many other places of the East, especially Japan, Siam, Surat, and Persia. But very good porcelain is now made in various parts of England, as well as at Dresden, and in France.

The Chinese call this manufacture *tse-ki:* the origin of the term *porcelain* does not appear to be decidedly known; the French call it *porcelaine;* the Italians *porcelanna.* Whether porcelain was known to the Romans is uncertain, as the Roman writers give us no decisive information concerning it. It is not known who was the inventor of this elegant manufacture; the Chinese annals are said to be silent about it; it appears, however, pretty certain, that porcelain must have been known as early as the fifth century.

It is said that the porcelain of China is made chiefly, if not entirely, at Kingteching, which has had the honor of supplying the greatest part of the world with this commodity, but England now bids fair to deprive China of much of her traffic in this elegant production.

The most perfect and beautiful porcelains of Japan and China are said to be composed of two distinct earths: a porcelain is produced which scarcely vitrifies at the utmost furnace heat which art can excite. It is also very hard, beautifully semi-transparent, very white when not artificially colored, tough and cohesive, so that it may be made very thin, and bears sudden heating and cooling without cracking.

GLASS.—BOTTLES.

GLASS is a transparent, solid, brittle body, produced by a mixture of earthy or metallic with saline substances melted together, by an intense heat. There are three principal kinds of glass, distinguishnd by the form or manner of working them, viz. round glass as our vessels, phials, drinking glasses, &c.; table or window glass, of which there are divers kinds; and crown glass and plate glass, or looking glass.

WORKING OR BLOWING ROUND GLASS. The furnace in which the glass is melted, is round, and has several apertures, through one of which the fuel is introduced; the others serve to lade out the melted metal, which is fused in pots made of tobacco pipe clay, or some other material capable of resisting the heat. When the ingredients are perfectly fused, and sufficiently hot, part of the melted matter is taken out at the end of a hollow tube about three feet long, which is dipped into it, and turned about till a sufficient quantity is taken up; the workman then rolls it gently upon a plate of iron, or marble, to unite it more intimately; he then blows through the tube, till the melted mass at the extremity swells into a bubble; after which he rolls it again on a smooth surface to polish it, and repeats the blowing till the glass is brought to the size and form necessary for the required vessel; he shaping with pincers or scissors, according to circumstances.

*Crown* or *Window glass* is formed in a similar manner, except that the liquid mass is blown into large globes, and detached from the first iron tube by the assistance of a second person, who fixes his iron tube at the opposite side of the globe; and the man who originally blew it, then separates his tube from it; the mouth of the globe is gradually widened till it ultimately becomes, in the hand of the workman, a circular planisphere.

*Plate Glass* for *Looking Glasses* and some superior windows, is made by causing the melted glass to flow upon a table; made either of pot metal or of copper, with iron ledges to confine the melted matter; and as it cools, a metallic roller is passed over it, to reduce it to an uniform thickness. After being annealed, that is cooled in an oven or furnace very gradually, it is ground and polished thus.—The glass is laid horizontally upon a flat stone table, made of very fine grained free-stone: then taking a smaller piece of rough glass, and fastening it to a heavy wooden plank, the workmen continue to rub one glass backwards and forwards upon another, till they acquire a great degree of smoothness. While they are thus employed, they pour in water and sand, then a finer sort of sand, and lastly powder of smalt. When the grinder has done his part, by bringing the glass to an exact plainness, it is turned over to the polisher, who with the fine powder of Tripoli stone, or emery, and a putty formed of lead and tin calcined together, brings it to a perfect evenness and lustre.

Glass is colored blue by oxide of cobalt; red by the oxide of gold; green by oxides of copper or iron; yellow by oxides of silver or antimony; and violet by oxide of manganese.

BOTTLES. Glass bottles are better for liquors than those of stone. Foul glass bottles are cleaned by rolling sand or small shot in them. But it frequently happens that some of the shot are left behind; and when wine or beer is again poured into the bottles, this mineral poison

will slowly dissolve, and impregnate those vinous liquors with its deleterious qualities. The sweetness which is sometimes perceived in red port wine, may arise from this cause, when it is neither designed nor suspected. It is much better, therefore, to use nothing but sand, or the dust of coal, or coarse brown paper, which are very effectual for the purpose.

PUTTY, sometimes denotes powder of calcined tin, which is used in polishing and giving a lustre to works in marble, glass, iron and steel. The putty commonly used by glaziers, is composed of linseed oil and whiting, with or without the addition of white lead. The whiting is first powdered very fine, then oil and white lead (should any be deemed necessary for the purpose intended) are well wrought with it, and incorporated together. The mixture is beaten till the whole is thoroughly blended, and becomes a tenacious mass like dough.

A PIN is an article well known. It is not easy to trace the invention of this useful implement. It is first noticed in the English statute book, in the year 1483, prohibiting foreign manufactures. In the reign of Henry VIII. it would seem, pins were then considered a new invention, and probably brought from France, when they were esteemed articles of luxury. Hence arose the term pin money, an allowance made by the husband to the wife for her own spending. The art, however, of making pins from brass wire, was not known in England before 1543; before that period they were either made of bone, ivory, or box.

Pins are made in the following manner:—The brass wire, reduced to its proper dimensions for drawing, is straightened, and afterwards cut into lengths of three or four yards, and then into smaller ones, every length being sufficient for six pins; each end of these is ground to a point, upon grind stones, by boys, who will point 16,000 pins in an hour. When the wire is thus pointed, a pin is taken off from each end; and this is repeated, till it is cut into six pieces. The heads are next formed by means of a spinning wheel; one piece of wire being thus with astonishing rapidity wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions; it is then cut with shears, every two circumvolutions or turns of the wire forming one head; these are softened by placing them in a furnace till red hot. When cold, they are distributed to children, who sit with anvils and hammers before them, which they work with their feet by means of a lathe, and taking up one of the lengths, they thrust the blunt end into a quantity of the heads which lie before them, and catching one at the extremity, they apply them immediately between the anvil and the hammer, and by a motion or two of the foot, the pin and the head are fixed together in a very expeditious manner. The pin is now thrown into a copper, containing a solution of tin and the lees of wine. Here it remains for some time, when it assumes a white, though dull appearance; to give it a polish, it is put into a tub with a quantity of bran, which is set in motion by turning a shaft that runs through its centre, and thus, by means of friction, it becomes entirely bright. The pin being complete, the bran is winnowed from it, leaving the pin fit to be stuck in paper for immediate sale. Pins are distinguished in commerce by numbers; the smallest are called *minikins;* the next *short whites;* the next larger ones, No. 3, 3½, 4, 4½, and 5, to

the 14th; whence they go by twos; viz. 16, 18, 20, which is the largest size. Pins are sold in papers and packets, as thus numbered, and also by the pound weight in assorted sizes. There are also *black* pins, pins with double heads, &c.

NEEDLES were first made in England by a native of India, in 1545, but the art was lost at his death; it was however recovered by one Christopher Greening, in 1660. This familiar little instrument makes a very considerable article of commerce and the consumption is almost incredible. The German and Hungarian steel is of most repute for needles. The steel being placed in the fire, and afterwards hammered to bring it to a round form, is passed through successive holes of the wire drawing machine, till it is of the proper size: it is then cut into suitable lengths; these pieces are flattened at one end on the anvil, to form the head or eye; they are then put into the fire to soften them further, thence taken out and pierced at the extreme of the flat part on the anvil, by a puncheon of well tempered steel, and laid on a leaden block, to bring out, with another puncheon, the small piece of steel remaining in the eye. The corners are then filed off the square of the heads, and a small cavity filed on each side of the flat of the head; this done, the point is formed with a file, and the whole filed over; they are then made red hot over a charcoal fire, and afterwards thrown into a basin of cold water to harden. When hardened, they are laid in a shovel on a brisk fire, to temper and take off their brittleness. They are then straightened one after another with the hammer; the next process is the *polishing;* 12 or 15,000 needles are ranged in small heaps on a piece of new buckram sprinkled with emery dust; they are afterwards sprinkled with oil of olives; lastly, the whole is made up into a roll and laid on a polishing table, and over it a thick plank loaded with stones, which two men work backwards and forwards, till the needles are polished. When taken out, they are washed with hot water and soap, and wiped in bran. The good are now separated from the bad, and the points smoothed on an emery stone. This operation finishes them; and nothing remains but to make them up in packets.

Needles are distinguished into *common* and *Whitechapel*, this last by having a *c* marked upon each needle; *sharps, betweens,* and *blunts: darning* needles, *double longs*, and No. 50, &c.; besides which, there is the *netting* needle, the *knitting* needle, the *glover's* needle, with a triangular point, the *tambour* needle, *surgeon's* needles, &c.

BLEACHING is the art of whitening linens, stuffs, silk, and many other substances.

Although the ancient inhabitants of India, Egypt, and Syria, knew in some sort, a method of carrying off the coloring matters with which cloth is stained; and although Pliny mentions that the Gauls were acquainted with a lixivium, extracted from the ashes of vegetables, and knew how to combine it with oil to form soap, yet their knowledge of bleaching was very imperfect. Even in India, at the present time, it is said that the art of bleaching is no further advanced than it was in the time of Herodotus. Indeed, in Europe, till toward the end of the 18th century the art of bleaching advanced slowly; but the discovery of

*oxymuriatic acid*, as a material for bleaching, has given an impulse unknown in any other art.

*Bleaching Silk.* Raw silk is put into a thin linen bag, thrown into a vessel of boiling river water, in which soap has been dissolved, and then boiled two or three hours, the bag being turned over several times; taken out, beaten, and washed in cold water, mixed with soap and a little indigo. The indigo water being slightly wrung out, the silk is put into a vessel of cold water; after taking it out of which, it is wrung, and all the water and soap expressed: shaken out to untwist and separate the threads, and hung up in a kind of stove made on purpose, where sulphur is burnt, the vapor from which, gives the last degree of whiteness to the silk.

*Bleaching of woollen stuffs.* There are three ways of whitening these; the first, with water and soap; the second, with vapor of sulphur; the third, with chalk, indigo, and vapor of sulphur. For the first, the stuffs being taken from the fulling mill, are put into soaped water rather hot, and worked afresh by force of arms over a bench, which finishes the whitening the fulling mill had begun; and lastly, washed out in clear water and dried; this is called the *natural way of bleaching*. In the second method, they begin by washing the stuff in river water; it is then laid to dry on poles, and when half dry, spread out in a kind of stove, well closed, wherein is burnt sulphur; the vapor, diffusing itself, sticks by degrees over all the stuff, and gives it a fine whitening; this is commonly called *bleaching by the flower*. In the third method, after the stuffs have been washed, they are thrown into cold water, impregnated with chalk and indigo; after they have been well agitated here, they are washed afresh in clear water, half dried on poles, and spread in a stove to receive the vapor of the sulphur, which finishes the operation. This is not esteemed the best method of bleaching, though agreeable enough to the sight. It may be here observed, that when a stuff has once received the steam of sulphur, it will scarcely receive any beautiful dye but black or blue, unless well washed in alkaline lye, and rinsed, previously to being put into the dye vat.

*Bleaching of Hollands or fine linens.* After taking them from the loom, while yet raw, they are steeped in clean water, rinsed out, and cleared of their filth in a tub filled with a cold lixivium or lye. When taken out of the lye, they are washed in clean water, spread on a meadow and watered from time to time. After lying a certain time on the ground, they are boiled in a new lye of potash or barilla, and again washed in clean water, soaped with black soap, passed through rubbing boards, and the soap washed out in clean water; they are then steeped in sour milk, which finishes their whitening and scouring, gives a softness, and makes them cast a little nap; when taken out of the milk, they are washed in clean water for the last time. After all this process, they give the linen its first blue, by passing it through water, wherein a little starch and smalt, or powder blue, has been steeped. Lastly, the proper stiffness and lustre are given with starch, pale malt, and certain gums, the quantity and quality whereof is adjusted according to occasion. In fine weather, the whole process of bleaching is completed in a month's time; in bad, it takes up six weeks or more.

*Coarse linens* are taken from the loom, and laid in wooden frames full of cold water, where, by means of wooden hammers worked by a

water mill, they are beaten so as insensibly to wash and purge themselves of their filth; then spread on the ground, where the dew which they receive for a week takes off more of their impurity; they are then put into a kind of wooden tubs, or pans, with a hot lye over them, and afterwards boiled with potash, kelp, or barilla. Thus lixiviated, they are again purged in the mill, laid afresh on the ground, and after about a week more passed through a second lye, and all things repeated, till such time as they have acquired their just degree of whiteness.

The process of bleaching, not only linens and cottons, but rags for paper, with oxymuriatic acid, or rather with solutions of *oxymuriate of potash* or *oxymuriate of lime*, has now been generally adopted; and with the use of these, linens can be made as white in six days, as formerly they were in six weeks.

WOOL. Woollen cloths are extensively manufactured in England, France, Netherlands, Prussia, and in some other places on the continent of Europe. Those of Silesia, in Prussia, are among the most perfect produced; and they annually amount to more than 50,000 pounds in value. The woollen cloths of France have long been distinguished for fineness and durability. In Spain, and most other countries of Europe, this manufacture is in an imperfect state. Coarse cloths are made in considerable quantities in the northern countries; but not enough generally for home consumption. England furnishes the great supply of woollen goods; a due proportion of which are of superior excellence.

The woollen manufacture of that country employs about half a million of persons, and amounts annually to more than £16,000,000 sterling.

Within a few years, great attention has been paid to the growth and manufacture of wool, in various parts of the United States, and particularly in New England, and some of the Middle States. It is doubted, however, whether as much capital is at present invested in establishments of this kind, as a few years ago; and in consequence of the recent depressed state of the price of wool, there are probably fewer sheep by several millions. In a speech delivered in the House of Representatives on the 31st of January, 1827, by the Hon. John Davis, of Massachusetts, the amount of wool worked up was estimated by that gentleman at 32,000,000 lbs. and that 3,000,000 yards of broad, and 32,000,000 narrow cloths, were annually produced, giving employment directly or indirectly to 100,000 persons. It was stated, also, that more than one hundred millions capital were invested in the growth and manufacture of wool. The number of sheep were put at that time, at 15,000,000.

CLOTH, in commerce, in its general sense, includes all kinds of clothing woven or manufactured in the loom, except silk; whether the threads be of wool, cotton, hemp, or flax. Cloth is, however, more peculiarly applied to woollen threads interwoven, some of which are called *warp*, and extend lengthwise, from one end of the piece to the other; the others are called the *woof*, and disposed across the first, or breadthwise of the piece. Cloths are of various qualities, fine, coarse, strong, &c.; some are of different colors; others are wrought white, and afterwards dyed in the piece. Their breadths and lengths are various. The goodness of woollen cloth consists in the wool being fine and well dressed; in its being spun equally, always observing, however,

that the thread of the warp be finer and better twisted than that of the woof; in its being well cleared of the knots and other imperfections, and well cleansed with fuller's earth, and afterwards properly dyed, dressed, and pressed.

Cloth is distinguished by being either *plain* or *kersey* woven. The first method consists simply in the threads crossing each other at right angles; in the last they are crossed so as to give an additional strength to the cloth; hence it appears in diagonal lines or rows running obliquely across the piece; and, in general, this style of weaving adds thickness as well as strength to the fabric. In the cotton manufacture, cloth, so woven, is called *twilled*.

*Manufacturing of white cloths for dyeing.* The wool is first scoured in a liquor composed of three parts of water and one of urine: it is then drained, washed in running water, and hung out to dry in the shade. When dry, it is beaten with rods on hurdles of wood, or on ropes, to clear out the dust and grosser filth. After beating, it is well picked, to clear the rest of the filth that had escaped the rods. It is now oiled, and carded on large iron cards, placed aslope. The best oil for the purpose is olive oil. The wool is now given out to the spinners, who first card it on the knee with small fine cards, then spin it by a wheel, observing to make the thread for the warp smaller than that for the woof, and much closer twisted. When warped, it is stiffened with *size*; that which is made with shreds of parchments is the best. When dry, the weavers mount it in the loom. Formerly there were two weavers to each loom, one on each side, treading at the same time alternately on the same treadle; i. e. now on the right step, and now on the left, which raised and lowered the threads of the warp equally; between which they threw, transversely, the shuttle from one to the other. This, however, is now performed by one person, by means of what is called a flying shuttle. Each time that the shuttle is thrown, so that a thread of the woof is inserted within the warp, he strikes it with the frame wherein the comb, or reed, is fastened, between the teeth of which the threads of the warp are passed, repeating the stroke as often as is necessary. The weaver having continued his work till the whole warp is filled with woof, the cloth is finished. It is then taken off the loom by unrolling it from the beam whereon it had been rolled, in proportion as it was woven, and given to be cleared of the knots, ends of thread, straws, and other filth, which is done with little iron nippers. In this condition, it is carried to the fullery, to be scoured with urine, or fuller's earth, well cleaned and steeped in water, put along with the cloth into the trough, wherein it is fulled; and after undergoing a variety of other manipulations and processes necessary to the perfection of the cloth, and being also dyed of the particular color desired, it is ready for the market.

The above is the usual process of weaving woollen cloth in the small way, as formerly, as well as now sometimes practised; but the ingenuity of modern times, and the steam engine, have very materially altered many of the processes above described. The *spinning*, in particular, is now, in our large manufactories, no longer performed by the hand and the wheel, but a method is adopted, by which one person can direct the spinning of thirty or more threads at once, and this so regularly and expeditiously, as to set at nought the former practice. The machinery

of such spinning is moved by steam, as indeed, is even the carding of the wool, and many other processes not formerly thought capable of being brought to machinery subjection.

For the manufacture of *mixed cloths*, or those wherein the wools are first dyed, then mixed, spun, and woven of the colors intended, the process, except in what relates to the color, is mostly the same with that just spoken of. The method of adjusting the mixture, is by first making a felt of the colors of the intended cloth, as a specimen; the wool of each color is weighed, and when the specimen is to the manufacturer's mind, he mixes for use a quantity in the same proportion; estimating each grain of the specimen at twenty pounds weight of the same in the cloth to be made.

BAIZE is a kind of coarse, open, woollen stuff, having a long nap; sometimes friezed on one side, and sometimes not, according to the uses for which it is intended; it is of various colors, white, green, &c. It is without wale, being wrought on a loom with two treadles, like flannel. The manufacture of baize is very considerable in England, and in Flanders about Lisle and Tournay, &c. Formerly, the French, as well as the Italians, were furnished with baize from England; but for some time the French workmen have undertaken to imitate it, and set up manufactures of their own, and with success, especially at Nantes, Montpelier, &c. The export of baize is very considerable to Spain, Portugal, and Italy. Its chief use is for the religious, and for linings in the army; the looking-glass makers also use it behind their glasses, to preserve the tin or quicksilver; and the case makers to line their cases.

SERGE is *kersey* wove, and either white, colored, or figured. Colored serges, and figured *Duroys*, were very commonly worn by the lower orders in the west of England, some years ago; but these manufactures have been superseded by *bombazets* and printed cottons. White serge is however still in use, and is a useful and durable material, superior in strength to flannel or baize.

BOMBAZET, a woollen manufacture of various colors, now much worn; some of it is got up to look glossy and very much like silk; it is a valuable and useful manufacture. It is commonly woven plain, sometimes, however, it is twilled.

WORSTED is a kind of hard-twisted and doubled or trebled woollen thread. It is chiefly used either to be knit or woven into stockings, caps, gloves, and the like. The name worsted is supposed to be derived from the town of Worstead, in Norfolk, noted for fine spinning. They who write it woolsted, do it on a supposition of the word being formed from wool, the matter of this thread.

FLANNEL, a kind of soft, slight, loose woollen stuff, but very warm, composed of a woof and warp and woven on a loom, with two treadles, after the manner of baize.

CALAMINCO, or MINCO, a sort of woollen stuff manufactured in England and Brabant. It has a fine gloss, and is chequered in the warp, whence the checks appear only on the right side. Some calamincoes are quite plain, and others with broad stripes, some with narrow stripes, and others watered.

CLOTHS.

TAPESTRY is a curious kind of manufacture, formerly used to adorn a chamber or other apartment, by hanging or lining the walls. The term is appropriated to a kind of woven hangings of wool and silk, frequently raised and enriched with gold and silver, representing figures of men, animals, landscapes, &c.

Two methods are adopted in weaving tapestry: in the *high warp* the cloth is woven *perpendicularly*, in the low warp *horizontally*. The low warps in Flanders have been said to exceed those of France. The chief are at Brussels and Antwerp, where they have succeeded in human figures, animals and landscapes, equally in the designing and the workmanship. It would be difficult and tedious to give a clear idea of the loom, or the manufacture of tapestry; it may be observed, however, that it is all wrought on the wrong side; so that the workman cannot see the right side of his tapestry till the piece is finished, and taken off the loom.

CAMLET, or CAMBLET, is a stuff made of hair, silk, or wool. In some, the woof is hair; the warp silk and wool twisted together. Camlets are manufactured in Holland and Flanders, and in Ireland and England. The true or oriental camlet is made of the pure hair of a sort of goat, frequently about Angora, in Natolia, and which makes the riches of that city.

A CARPET is a beautiful figured cloth, used for covering the floors of rooms, stairs, &c., generally composed of woollen stuff, either wrought in a loom, or with the needle. Formerly there were Persian and Turkish carpets made of silk, and some are still made of this substance, and of hair; but the principal part are now made of colored woollen yarn, manufactured into divers patterns and figures, often approaching to those of tapestry. In Germany, carpets are made of wool, and embellished with silk in needle-work. But the first and most extensive manufactures of carpeting exist in England, particularly those at Axminster, Wilton, Kidderminster, &c. There are three principal sorts of carpeting; the Turkey, the Wilton, or Brussels, and the Kidderminster, or Scotch. Both the first and second have smooth backs, and a nap on one side. The Turkey is distinguished by a very thick nap; it is the dearest, the warmest, and the most durable. The Brussels, as it is called, though manufactured in England, has now nearly superseded the Wilton. The best of the Kidderminster and Scotch carpets are woven double, without any nap, so as to be similar in texture on both sides, and similar in pattern, the colors only being reversed. These are cheaper than the Brussels or Wilton, and nearly as durable. Carpets are sometimes woven in one piece for a room, with a border: but most commonly they are woven in long pieces, which are afterwards sewed together to make the breadth desired. At Axminster and in London, excellent carpets of the Wilton or Brussels, as well as of the Turkey kind, are made of the largest dimensions, suited to the full extent of drawing-rooms, all in one piece. The large carpets are made on frames and rollers, somewhat similar to tapestry. Carpet making has become a very flourishing and valuable manufacture, which employs a great number of industrious people, and being almost wholly performed with the produce of our own country, is of great importance as a national concern. Carpets having hair or shag

on one side only were called by the ancients *tapetes*, those with shag on both sides *amphitapetes*. The use of carpets is of great antiquity, and they were no less a luxury among the ancient Greeks than among the moderns. They also give an appellation to a kind of knights, who being mercantile or professional men, not addicted to the art of war, received the honor of knighthood from the king's hands, kneeling at court on a carpet, and hence called *Carpet Knights.*

DYEING, the art of staining cloth and other articles of different colors is of great antiquity, as appears from the traces of it in the oldest, sacred as well as profane writers. The honor of the invention is attributed to the Tyrians: though what lessens the merit of it is, that it is said to have owed its origin to chance. The juice of certain fruits, leaves, &c. accidentally crushed, are supposed to have furnished the first hint. Pliny assures us, that even in his time the Gauls made use of no other dyes; it is added that colored earth and minerals, washed and soaked in rain, gave the next dying materials. But purple, an animal juice, found in a shell fish, *purpura,* seems from history to have been prior to to any of them. This indeed, was reserved for the use of kings and princes; private persons were forbidden by law to wear any of it. The discovery of its tinging quality, is said to have been taken from a dog, which having caught one of the purple fishes among the rocks, and eaten it up, stained his mouth and beard with the precious liquor; this struck the fancy of a Tyrian nymph so strongly, that she refused her lover, Hercules, any favors, till he had brought her a mantle of the same fine color.

Of the great variety of known dyes, few only can be applied to animal or vegetable fibre, without any other preparation than that of cleansing the stuff, and immersing it in a decoction or infusion of the dye. And hence it is necessary, to render most colors permanent, that the article to be dyed should be previously impregnated with what has been termed a *mordant*, generally a salt having an alkaline, earthy, or metallic base; thus alum, sulphate of lime, muriate of tin, sulphate of iron, tannin, and oil, are mordants, according to the dyes, and to the substances to which they are to be applied. When the dye imparts to cloth a permanent color, without the intervention of a mordant, it is called a *substantive* color; when it requires a mordant to impart a permanent color it is called an *adjective* color. *Indigo* is a substantive, *madder* an adjective color: cochineal is also an adjective color: for although the red of the cochineal will stain the cloth while it remains immersed in the solution, yet, as soon as it is taken out and washed, this temporary stain will immediately vanish, and the cloth become as white as before. But if the cloth be dipped in a solution of some alkaline or metallic salt and then immersed in the solution of cochineal for some time, it will come out permanently colored; nor will the color ever be discharged, even by washing with soap and water.

*The materials for dyeing* different colors are many and various. Some ingredients produce durable colors, which cannot be discharged, either by exposure to air or washing with soap; others, though they may be made to stand the action of soap pretty well, cannot by any means be enabled to resist the action of air. These are distinguished by the different names of *true* and *false*, *permanent* and *fading*, or

*substantive* and *adjective* colors; nor is there any method yet discovered of giving the false colors an equal degree of durability with the true ones. A solution of tin in nitro-muriatic acid will give most of the fading colors a high degree of beauty, and some share of durability, though even this is not able to make them equal to the others. The most permanent dyes we have are cochineal and lac for fine reds and scarlets; indigo and woad for blue; and, when mixed in different proportions with cochineal or lac, for purple and violet colors; weld and some other vegetables for yellow; and madder for coarse reds, purples, and blacks. The fading colors are much more numerous. In this class are included Brazil wood, log wood, peach wood, red wood, fustic, turmeric root, annotto, archil, &c.

With regard to the mordants used in dyeing, it has been too often customary to mix a quantity of different ones, by which the color has been generally spoiled. This truth should therefore be constantly before us, that, in general, one single mordant will answer for this purpose better than a hundred. A mixture should only be made, where it is necessary to produce the color desired; and if a dyer proceed in this simple manner, he may not only attain to great perfection in the art from his own experience, without being taught by others, but even make considerable discoveries; as dyeing is at present far from being brought to perfection. The mordants chiefly to be used in dyeing, are fixed alkalies; solutions of tin in sulphuric and muriatic acids, and in nitro-muriatic acid; sugar of lead; cream of tartar; alum; sulphuric acid; and solution of iron in the acetous acid. By means of these, almost all kinds of colors may be dyed at an easy rate, and with very little trouble. Observe, the acids, and acid solutions, must be diluted with a considerable quantity of water before they are used.

General rules for dyeing all colors. Having well cleansed the substance to be dyed, and made choice of the mordant proper for fixing the color desired, dissolve it in water, and steep the substance in this solution for twenty-four hours. Then take it out, and without wringing hang it up to dry, but without heat, and for this it will be proper to allow a pretty long time as the more perfectly the mordant penetrates the cloth the more durable will the color be. Having then prepared a colored solution or decoction, put the cloth into it. The less heat is applied during the time the cloth remains in the dye, the finer the color will be; but the longer time will be required for completing the operation. If time cannot be spared, so that a strong heat must be applied it will be necessary to roll the cloth during the time of dyeing or the color will be in danger of proving unequal. After the dyeing is completed, rinse the cloth in cold water, but do not ring it strongly; and then hang it up to dry. In this way may be dyed a great variety of colors, on wool, silk, cotton, and linen, without any variation in the process. A solution of tin in the sulphuric acid will produce all degrees of red, from the palest pink or rose color, to the highest crimson and scarlet; and this, on all the before mentioned substances, without exception.

*Cotton and Linen* may be dyed, by means of the before mentioned solution, of the most beautiful red, crimson, and scarlet colors. The same may be done by a solution of tin in nitro-muriatic acid; but un-

less the nitrous acid prevail greatly in the mixture, the colors produced by this last will incline more to purple than the former. With solution of tin in muriatic acid they incline remarkably to purple, and are likewise deficient in lustre. The first two solutions therefore are capital ingredients in dyeing. Latterly, cottons have been dyed a fine and permanent Turkey red by means of madder, but the manipulations are too complex to detail.

The same preparations will also serve for dyeing all other colors, blue and green excepted. Thus a piece of cloth prepared with solution of tin in sulphuric acid, if boiled with the decoction of cochineal, will come out of a scarlet color; if with turmeric, weld, fustic, or many of the common yellow flowers, it will come out different degrees of yellow; with Brazil wood, peach wood, &c. it will give a fine purplish crimson; with log wood, a fine deep purple, &c.; and by combining these in different ways, an affinity of different shades may be produced.

Green colors are to be produced only by a mixture of blue and yellow; no ingredient being yet discovered, that will, by itself produce a good green dye. It is usual first to dye the cloth blue with indigo, and then yellow with any yellow coloring ingredient, by which means a green color is produced. Cloth and silk may be dyed green with indigo; but they must first be boiled in yellow dye, and then in blue.

Black colors are dyed by preparing the cloth with any solution of iron, but that in the acetous acid is the best; and then boiling it in a decoction of any astringent vegetable. Those chiefly made use of for the purpose, are galls, sumach, log wood, and madder. Of these the last is most durable: though galls will also produce a pretty lasting color, if properly managed. Log wood dyes a very pretty, but fading black color. It appears, however, by an experiment made by Mr. Clegg, that by a proper preparation of the cloth with mixed alkaline salts, black colors dyed with log wood might be improved, both as to beauty and durability. The finest blacks are first dyed blue, with indigo; and afterwards black, with a solution of iron, and some astringent vegetable. These are the best methods of producing permanent colors of all kinds. As it is necessary however, often to give another color to stuffs which have already been dyed, it is also necessary that a dyer should know how to discharge colors, as well as to make the cloth imbibe them.

Thread, is dyed a bright blue with braziletto and indigo. Bright green is first dyed blue, then black, boiled with braziletto and verditer, and lastly welded. A dark green is given like the former, only darkening more from welding. Lemon or pale yellow is given with weld, and rocou or annotto. Orange and Isabella, with fustic, weld, and annotto. Red, both bright and dark, with flame-colors, &c. are given with Brazil, either alone, or with a mixture of annotto. Violet, dry rose and amaranth, are given with Brazil, taken down with indigo. Fillemot and olive color are given with galls and copperas, taken down with weld, annotto, or fustic. Black is given with galls and sulphate of iron, taken down and finished with braziletto wood.

*Tanned Leather, Skins, &c.*, are dyed of black color by rubbing them over three or four times with a solution of sulphate of iron, or a solution of iron in the vegetable acids. For leathers that have not

been tanned, some galls or other astringents are added to the solution of iron; and in many cases, particularly for the finer parts of leather, and for renewing the blackness, ivory black or lamp black is used. A blue color is given by steeping the subject a day in urine and indigo, then boiling it with alum; or by tempering the indigo with red wine, and washing the skins therewith. Red is given by washing the skins and laying them in galls; then wringing them out; dipping them in a liquor made with privet, alum, and verdigris in water; and lastly in a dye made of Brazil wood boiled in lye. Purple is given by wetting the skins with a solution of roche alum in warm water, and, when dried, with a decoction of log wood in cold water. Green is given by smearing the skin with sap green and alum water boiled; to darken the color, a little indigo may be added. Dark green is also given with steel filings and sal ammoniac steeped in urine till soft, then smeared over the skin, which is to be dried in the shade. Sky color is given with indigo steeped in boiling water, and the next morning warmed and smeared over the skin. Yellow by smearing the skin over with aloes and linseed oil, dissolved and strained; or by infusing it in weld. Orange color is given by smearing with fustic berries, boiled in alum water; or, for a deep orange, with turmeric.

*Wood*, for inlaying, veneering, &c., is dyed red by boiling it in water and alum; then taking it out, adding Brazil to the liquor, and giving the wood another boil in it; black, by applying a solution of log wood, boiled in vinegar, hot, with a brush, and afterwards washing the wood over with a decoction of galls and sulphate of iron till it be of the hue required. Any other color may be given by squeezing out the moisture of horse dung through a sieve, mixing it with roche alum and gum arabic, and to the whole adding green, blue, or any other color designed. After standing two or three days, the wood, cut to the thickness of half a crown, is put into the liquor boiling hot, and suffered to remain till it is sufficiently colored. New mahogany may be made of a dark color, by smearing it over with a paste made of quick lime and water.

*Bone*, *Horn*, and *Ivory*, are dyed black by steeping brass in aquafortis till it is turned green; with this, the bone, &c. is to be washed once or twice, and then put into a decoction of log wood and warm water. Green is begun by boiling the bone, &c. in alum water; then with verdigris, sal ammoniac, and vinegar, keeping it hot therein till sufficiently green. Red is begun by boiling it in alum water, and finished by decoction in a liquor compounded of quicklime steeped in rain water, strained, to every pint of which an ounce of Brazil wood is added; the bone, &c. to be boiled till sufficiently red.

SOAP is a kind of paste, sometimes hard and dry, and sometimes soft, much used for washing, and whitening linens, and for various other purposes, by dyers, perfumers, hatters, &c.

Soap is a chemical compound, produced by the union of any of the fixed oils with alkalies, earths, or metallic oxides. The alkalies and particularly *soda*, are necessary to the production of good soap; and it is also necessary that they should be applied to the oil or tallow in a caustic state; to this end, when an alkali is dissolved in water, lime is added to the solution to absorb the carbonic acid of the alkali; the li-

quor deprived of its carbonic acid is called *soap lye:* it is exceedingly caustic, and will decompose human flesh. This lye is usually made strong enough to float a new laid egg. With this lye, oil, or tallow, or resin, according to circumstances, is boiled till it unites into the compound known as soap. The tallow for making soap is reckoned very good, if thirteen cwt. of it yield with alkali a ton weight of soap.

*White soap* of the best quality is made with olive oil and soda; or with tallow and soda, obtained from barilla, or impure carbonate of soda.

*Yellow soap* is made with tallow and yellow resin, in the proportion of ten parts tallow, and three and a half of resin; these, with the addition of the lye, make twenty of soap.

*Mottled soap* obtains its speckled appearance, either by dispersing the lye through it towards the end of the operation, or by adding sulphate of iron, oxide of manganese, or indigo.

*Windsor soap* is the common white soap, scented with oil of caraway seeds or other scent.

*Black soap* and other *soft soaps* are made from fish oil and a lye of potash, made in a similar manner as soap lye above, or with inferior tallow and such lye.

*Castile soap* is sometimes made from common white soap having a solution of sulphate of iron mixed with it in cooling, to give the marbled appearance. But the best Castile soap is brought from Marseilles, although it is also brought from Spain. It is most probably composed of olive oil and soda, and sulphate of iron to impart to it the marbled appearance.

*Soap balls* for washing the hands, are made of various colors, by simply cutting white soap into small pieces, rolling them in vermillion, blue, or other color, and squeezing them together into balls; they are scented at the will of the maker.

A cheap soap is sometimes made of woollen rags, &c., and even with the horns of animals instead of oil; but the smell is commonly very disagreeable.

Soap, as a medicine, (the foreign Castile soap is, for this purpose, considered the best) is generally regarded as purgative, lithontripic, and tonic: it is also given to counteract the effects of metallic and other poisons; but common white soap is better for such purpose. Soap is also used externally for sprains and bruises; it is an ingredient in the well known soap liniment or *opodeldoc.*

CANDLES. There are two sorts of tallow candles; *dipped* and *moulded.* The moulded are the invention of the Sieur le Brege, of Paris. In making candles, the general method is, after weighing and mixing the tallow in due proportions, to cut it into small pieces, that it may more readily melt. When properly melted and skimmed, a certain quantity of water is poured into it, in order that all remaining impurities may precipitate to the bottom. No water, however, must be thrown into the tallow designed for the *first three dips*, because the wick would imbibe the water and thus render the candles unfit for burning.—The tallow thus melted, is poured into a tub, through a coarse sieve of horse hair to purify it still more, and may be used after having stood

three hours. It will continue fit for use twenty-four hours in summer, and fifteen in winter. The wicks are made of spun cotton, several threads of which the tallow chandlers wind into bottoms or clews; whence they are cut off with an instrument, into pieces a little more than twice the length of the candle; and then put on the sticks for dipping. To make a tallow candle good, there must be an equal quantity of sheep's and bullock's tallow. Lard is always inadmissible. The wick ought to be properly twisted, neither too hard nor too loosely, sufficiently dry and pure, otherwise the candle will emit an irregular, inconstant flame. Lately, machinery has been invented, by which the facilities of dipping the wicks have been increased, and the labors of the tallow chandler considerably abridged.

MOULD CANDLES are so called, because made in moulds of brass, pewter, or lead; but pewter is the best. Each candle has its mould. A number of these moulds having the wick fixed in the middle, are placed in a table or frame, full of holes, and filled with melted tallow. After the moulds have stood long enough to cool, the candles are drawn out; and they are sometimes rendered whiter, by hanging them on rods, exposed to the dew and the earliest rays of the sun for several days.

WAX CANDLES. The wicks of wax candles are made of cotton or flax slightly twisted, and covered with white or yellow wax, but chiefly the former, well bleached. Of these candles there are several kinds; some of a conical figure, are used in funeral processions, &c. Others are of cylindrical form, used on common occasions. To make wax candles, an iron circle, on which are hung a dozen wicks at equal distances, is suspended over a large basin full of melted wax. A large ladle full of this wax is poured gently on the tops of the wicks, one after another; and this operation is continued, till the candle arrives at its proper size. The first three ladles must be poured on the top, the fourth, fifth, and sixth, lower down, at certain distances, to give the candle its conical form. The candles are then taken down, and afterward rolled and smoothed upon a walnut-tree table, with a long square instrument of box, smoothed at the bottom. When wax candles are made by the *hand*, they begin to soften the wax by working it in hot water, in a narrow but deep caldron. A piece of wax is then taken out, and disposed by little and little round the wick. Wax *tapers* are either made as the former, with a ladle, or drawn. The latter are drawn in the manner of wire, by means of two large rollers of wood, turned by a handle, which pass the wick through melted wax contained in a brass basin, and at the same time through the holes of an instrument.

SPERMACETI CANDLES are now universally used in theatres, drawing rooms, &c., as, should any drops fall from them on the clothes of the company, the spermaceti more readily comes off, whereas wax adheres more closely, and cannot be removed without disfiguring the cloth.

WAX is a yellowish matter, of which the bees form cells for their honey. There are two or three substances, which resemble each other so closely as to have received the name of wax. The first, and by far the most important, is *bees wax*, which is consumed in such vast quantities for giving light, and is also used for a variety of other purposes. Another kind of wax is the *myrtle wax* which is extracted pretty large-

ly in Louisiana, and some other parts of America, from the *myrica cerifera* or candle-berry myrtle. The next substance, very similar to wax, is the pella of the Chinese, the product of an insect; and the white matter extracted from lac has also a strong resemblance to wax. But although, from the latest researches, wax is not obtained from vegetables exactly as we find it in the combs of this animal, it being elaborated by some peculiar process of the animal itself, and hence may be considered an *animal* product, yet the constituents of wax, with slight modifications, are found in many vegetables; and hence wax may be also considered a vegetable production. The wax, however, obtained from the candle-berry myrtle, is much more like hard colored mutton suet than bees wax.

SEALING WAX may be made very good of the following materials; Shell lac, eight ounces; rectified spirit of wine, two ounces; camphor, half an ounce; Venice turpentine, four ounces; vermillion, two ounces and a half. Dissolve first the camphor in the spirits of wine, next the shell lac, then add the Venice turpentine, and lastly the vermillion. A careful application of heat is absolutely necessary, or the mass will take fire. An inferior wax may be made by adding yellow resin, and taking away a portion of the shell lac. *Black* wax may be made by merely substituting lamp black for vermillion.

STARCH is obtained from innumerable vegetable substances; but the starch of commerce is separated from wheat by steeping the grain in cold water till it becomes soft, then putting it into coarse bags, which are pressed into vats of water; a milky juice exudes, and the starch falls to the bottom of the vat. The deposited starch is collected, and dried in a moderate heat; when dried, it splits into the columns, or fragments in which it is usually sold. A little smalt or indigo is added to it to give it a blue tinge. Starch is used to stiffen linen, and for various other purposes. Made into a fine powder, it is used as *powder for the hair*. It is the nutritive part of most grains or roots, and may be extracted in considerable quantities from potatos and other roots. Vegetables indeed are esteemed nutritious in proportion to the quantity of this matter and gluten which they contain. Arrow root, tapioca, and sago, are principally if not entirely starch.

PAPER, sheets of a thin matter, made of some vegetable substance used principally for writing and printing. The materials on which mankind have, in different ages, contrived to write their sentiments, have been extremely varied. In the first ages they made use of stones, and tables of wood, wax, ivory, &c. At a more advanced period, skins were employed, and latterly, paper. The different kinds of paper, and materials employed in making them, are reducible to the following: *Egyptian paper* made of the rush *papyrus*, (the paper used by the Greeks and Romans was made of this plant, and hence the origin of the term *paper*:) *bark paper*, made of the inner rind of several trees; *cotton paper*, made of cotton wool; *incombustible paper*, made of asbestos; and *European paper*, made of linen rags. It appears that paper made from cotton was used as early as the ninth century. There are several Greek MSS. on such paper. The most ancient MS. on cotton paper, with a date, in the library of the King of France, was written in 1050.

*Linen or European paper* was first introduced towards the beginning

of the thirteenth century; but by whom this valuable commodity was invented is not known. The method of making paper of linen, cotton, or hempen rags is as follows:—the rags are first placed in a machine formed of wire, which is made to turn round with great velocity to whirl out the dust; they are then sorted according to their different qualities; after which they are put into a trough perforated with holes, defended by wire gratings, through which constantly flows a stream of clear water. In this trough is placed a cylinder, set thick with rows of iron spikes; at the bottom of the trough are fixed corresponding spikes. The cylinder is made to whirl round with great rapidity, so that the cloth is torn to atoms, and with the aid of water reduced to a thin pulp. By the same process, all the impurities are removed, and the pulp becomes perfectly white. The pulp being thus properly prepared is carried to a vat, called the *priming vat*, and mixed with a proper quantity of water. The vat is rightly primed when the liquor has such a proportion of the pulp, as that the mould on being dipped into it will just take up enough to make a sheet of paper of the thickness required. The mould is a kind of sieve, exactly of the size of the paper to be made, and about an inch deep, the bottom being formed of fine brass wire, guarded underneath with sticks, to prevent its bagging down, and keep it horizontal; and further to strengthen the bottom, there are large wires, placed in parallel lines, at equal distances, which form those lines often visible in white paper when held up to the light; the mark of the paper is also made in its bottom, by interweaving a large wire in any particular form. This mould the maker dips into the liquor, and gives it a shake as he takes it out, to clear the water from the pulp. He then slides the mould along a groove to the coucher, who turns out the sheet upon a felt or woollen cloth, lays another cloth on it, and returns the mould to the maker, who by this time has prepared a second sheet in another mould; and thus they proceed laying alternately a sheet and a felt, till they have made six quires of paper, which is called a post; and this they do with such swiftness, that in many sorts of paper two men make twenty posts or more in a day. A post of paper being made, it is placed under a a press, and all the water squeezed from it; after which it is separated sheet by sheet from the felts, and laid regularly one sheet upon another; and having undergone a second pressing, it is hung up to dry. When sufficiently dried, it is rubbed smooth with the hands, and laid by to be sized. The size is made by boiling shreds and parings of the tanner, currier, or parchment maker; and after mixing it with a certain quantity of alum, in a large tub, they dip as much paper at once as they can conveniently hold, and with a quick motion give every sheet its share of the size, which must be as hot as the hand can well bear; the superfluous size is then pressed out of the paper, which is afterwards hung up sheet by sheet to dry, and being taken down, is sorted, and what is only fit for outside quires laid by themselves; it is told into quires, which are folded and pressed. The broken sheets are commonly put together, and two of the worst quires are placed on the outside of every ream or bundle; and being tied up in wrappers made of the settling of the vat, it is fit for sale. Every common quire of paper contains twenty-four sheets; that for printing, twenty-five sheets. Each ream contains twenty quires.

Paper is of various kinds, and used for various purposes: with regard

to color, it is principally distinguished into white, blue, and brown; and with regard to its dimensions, into atlas, elephant, imperial, super-royal, royal, medium, demy, crown, post, foolscap, pot-paper, &c. *Wove paper* is made in moulds, the wires of which are so fine that the marks of them are scarcely visible. *Blotting paper* is made of woollen rags, and without size. *Pasteboard* is made in a similar way to that of paper; when it is wanted very thick, it is made by pasting the sheets of one upon another. *Mill-board*, used for covers of books, is made at once of very coarse rags, or old ropes, &c.; of which also *brown paper* is made. Besides paper from these materials, it is also occasionally made from straw: a Mr. Koop, in 1820, obtained a patent in England for straw paper. In the Maldive Islands, the natives are said to write on the leaves of a tree called *macarequean*, which are a fathom and a half long, and a foot broad; and in divers parts of the East Indies, the leaves of the *musa paradisiaca* or *plantain tree*, dried in the sun, served the same use, till of late the French taught them the use of European paper.

The process of paper making takes about three weeks. The greatest modern improvement in paper-making is the bleaching of the rags. This is done by different methods; one of the best consists of an air-tight chamber in which the rags are placed; a mixture of manganese, sea salt and sulphuric acid being heated in proper retorts to a certain extent, a gas is disengaged, which destroys all the color which the rags contain.

The machine for fabricating the paper from the pulp has been simplified, so that an immense saving of labor has been thus obtained.

Another improvement in the manufacture of paper has been made in the United States, by Messrs. Gilpin & Co. who have invented a machine by which paper of *any length*, in one continued succession of fine or coarse materials, may be produced.

*Egyptian paper* is that which was principally used among the ancients; made of a rush called *papyrus*, or *biblus*, growing chiefly in Egypt about the banks of the Nile; though it was also found in India; and Pliny describes the *papyrus* or *paper rush* as having a root of the thickness of a man's arm, and ten cubits long; from this arise a great number of triangular stalks, six or seven cubits high, each thick enough to be easily spanned. Its leaves are long like those of the bulrush; its flowers staminous, ranged in clusters at the extremities of the stalks; its roots woody and knotted like those of rushes, and its taste and smell near to those of the cypress. The moderns have arranged the papyrus under the genus *cyperus*, or cyper-grass, and thus designate it; *cyperus papyrus*, or paper rush, having a three-sided naked culm, umbel longer than the involucres; involucels three-leaved, setaceous; spikelets in threes; a native of Ethiopia and Egypt. This tribe of plants contains numerous species, many of which have fragrant roots.

*Marbled paper* is paper stained so as to appear in variegated colors like marble. The operation of marbling is thus performed; gum is first dissolved in a trough, into which they plunge each sheet of paper; this done, and all the colors ranged on the table, where also the trough is placed, they begin by dipping a brush of hog's hair into any color, commonly the blue first, and sprinkle it on the surface of the liquor. The red is next applied in the like manner, but with another pencil,

after this, the yellow, and lastly the green. When all the colors are thus floating on the liquor, to produce that agreeable marbling which we admire, the floating colors are curled and otherwise tastefully varied with a pointed stick; to these the surface of the paper is applied.

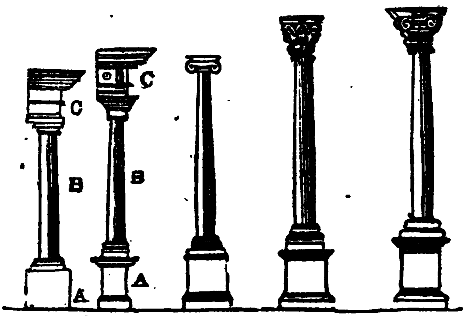
*Ivory paper* is a paper lately invented by Mr. Einslie, to be used instead of ivory for drawing and miniature painting, and is said to be superior to ivory itself. It consists in the preparation of a size from the cuttings of parchment, uniting, by a similar size, several sheets of drawing paper, and afterwards covering it with the size, having previously mixed it with some plaster of Paris in fine powder. Plaster of Paris gives a *white*; but oxide of zinc mixed in proper proportions, gives a tint nearly resembling ivory.

ARCHITECTURE. Architecture is the art of building, or the science which teaches the method of erecting buildings, either for habitation, defence, or ornament. It is an art of the first necessity, and almost coeval with the human species. Man, from seeking shade and shelter under the trees of the forest, soon felt the necessity and saw the utility of bending them to more commodious forms than those in which he found them disposed by nature. To huts made of trees and branches leaning together at top, and forming a conical figure, plastered with mud, succeeded more convenient, square, roofed habitations; the sides of these habitations, and the inner supports of the cross beams of the roofs, being trunks of trees; from them were derived those beautiful and symmetrical columns, *the orders of Architecture.*

Although this art was cultivated by the ancient Egyptians, Assyrians, and Persians, yet the Greeks justly claim the honor of having raised the first structures in which elegance and symmetry were combined with comfort and convenience in the plan.

The established five orders of architecture, the Tuscan, the Doric, the Ionic, the Corinthian, and the Composite, were brought to perfection under the Greeks and Romans. Modern efforts have added little or nothing to the beauty and symmetry of these columns, and the parts dependent on them, but much has been done in the internal improvement of mansions and houses.

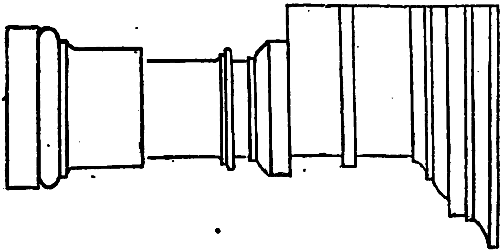
THE FIVE ORDERS OF ARCHITECTURE.



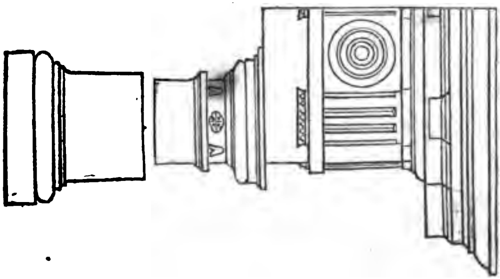

From the above, the reader will be able to form but an indistinct con-

ception, of the beauty of those ornamental columns, which in both ancient and modern times have excited the admiration of even the unlearned, and the uncultivated portion of mankind, which have had an opportunity to see them. A better conception will be had of the different orders of architecture from the following cuts, which stand in the same order as the above, and represent the Tuscan, Doric, Ionic, Corinthian, and Composite.

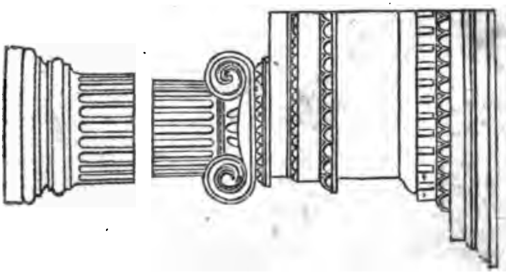
TUSCAN.



DORIC.

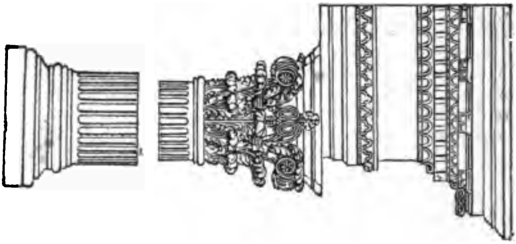


IONIC.

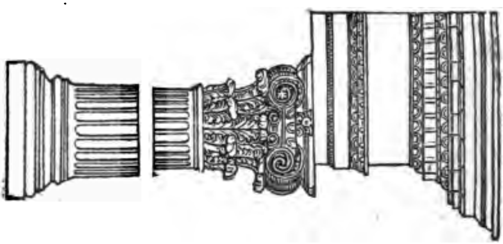


## ARCHITECTURE.

CORINTHIAN.



COMPOSITE.



Tuscan Order. Although there are no ancient remains of this order, it is generally placed first on account of its plainness. The Trojan and Antonine columns at Rome are commonly called Tuscan, though they do not exhibit Tuscan plainness. It is probable the Tuscan is only a simplification of the Doric, of which there are numerous ancient remains; but to Tuscany it evidently owes its name.

Doric Order. The origin of this order is ascribed to Dorus, who built a temple to Juno, in the ancient city of Argos. This order has a masculine grandeur, and a superior air of strength to either of the other Grecian orders, viz. Ionic and Corinthian. It is therefore best adapted to works of great magnitude, and of a sublime character. Of this order is the temple of Theseus at Athens, built ten years after the battle of Marathon, and at this day almost entire.

Ionic Order. The distinguishing characteristics of this order are lightness and elegance. It is likewise simple; for simplicity is an essential requisite of true beauty. Of this order were the temple of Apollo at Miletus, the temple of the Delphic Oracle, and the temple of Diana at Ephesus.

Corinthian Order. This is considered the finest of all the orders. It has been styled the "virginal order," from the delicacy, tenderness, and beauty of the whole composition. Exceptions, however, have been taken to it, it being thought to savor too much of pomp and splendor

and to mark an age of luxury and magnificence. Thompson has well characterized the three orders in the following appropriate lines:

——————————" First unadorned,
And nobly plain, the manly Doric rose;
The Ionic, then, with decent matron grace,
Her airy pillar heav'd; luxuriant last
The rich Corinthian spread her wanton wreath."

The most correct specimens of this order that remain in existence are to be collected from the Stoa, the arch of Adrian, the monument of Lysicratus, at Athens, the Pantheon of Agrippa, and the three columns of the Campo Vaccino at Rome, particularly the last.

COMPOSITE ORDER. This order is what its name implies: it shows that the Greeks had in the three original orders exhausted all the principles of grandeur and beauty, and that it was not possible to form a fourth, except by *combining* the former.

GOTHIC ARCHITECTURE. To the above five orders was afterwards added another, called the Gothic or Saracenic, the marks of which are its numerous and prominent buttresses, its lofty spires and pinnacles, its large and ramified windows, its ornamented niches and canopies, the sculptured saints and angels, the delicate lace-work of its fretted roofs, and an indiscriminate profusion of ornaments. But its most distinguishing characteristics are the small clustered pillars, and pointed arches, formed by the segments of two intersecting circles.

Of Gothic architecture, the continent furnishes some fine specimens, but the best examples, it is said, [illegible] to be found in England. In the edifices of that country, the whole [illegible]ress of this style of architecture can be traced. The period from 1272 to 1400 marks the golden age of the Gothic. From the time of Henry VIII. this style began to decline. This was succeeded by a mixture of the Grecian and Gothic. In the sixteenth and seventeenth centuries, the chaste architecture of the Greeks and Romans was revived. The first improvements took place in Italy, whence they passed into other parts of Europe, and though the Italians were long accounted the first architects, England produced Inigo Jones and Sir Christopher Wren, who hold the most exalted station.

The banqueting-house at Whitehall; queen Katharine's chapel at St. James'; the piazza of Covent Garden, and many other public buildings, are monuments of the taste and skill of Inigo Jones.

The churches, royal courts, stately halls, magazines, palaces, and public structures designed by Sir Christopher Wren, are proud trophies of British talent. If the whole art of building were lost, it might be again recovered in the Cathedral of *St. Paul*, and in that grand historical pillar called the *Monument.* To these we superadd *Greenwich Hospital, Chelsea Hospital, the Theatre at Oxford, Trinity College Library, and Emanuel College, Cambridge*, the churches of *St. Stephen in Walbrook, St. Mary-le-bon, and fifty-two others in London*, serve to immortalize his memory. While we contemplate these, and many other public edifices erected and repaired under his direction, we are at a loss which most to admire—the fertile ingenuity, or the persevering industry of the artist.

ARCHITECTURE.

The English architectural history of the eighteenth century differs from that of the preceding ages in two essential circumstances.

1. The *public* buildings erected during this period, are, in general, not so grand and massive as those of some former periods. But while they fall short of splendor and magnificence, they are superior to most ancient structures in simplicity, convenience, neatness, and elegance.

2. *Private dwellings* have been made more spacious, convenient, and agreeable to a correct taste, than in any preceding period. The liberal use of *glass* in modern buildings, contributes greatly to their beauty and comfort, and is a point in which the ancients were totally deficient. In descending to the various minute details of human dwellings, especially those which have reference to elegance and enjoyment, it is obvious the artists of the eighteenth century exceed all others.

ARCHITECTURE IN THE UNITED STATES. In the United States, we are yet in our infancy, both in respect to elegant and enduring specimens of architecture. This might well be imagined, considering the recent settlement of the country, and the creation, by means of industry and toil, of the capital which we possess. Still, architectural skill exists among us, and in respect to some buildings, it has been judiciously applied. We shall give a brief account of a few of the most important public buildings to be found among us.

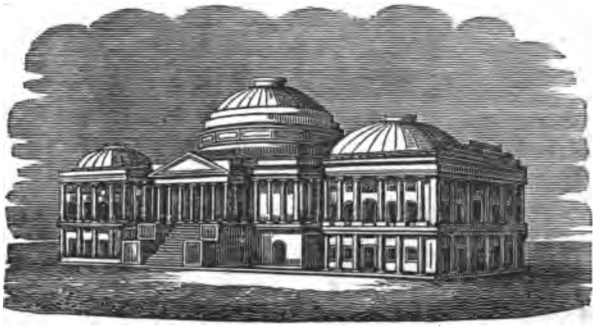
## CITY HALL, NEW-YORK.

The foundation stone of this noble building was laid on the 26th September, 1803, and was finished in 1812, at an expense, exclusive of the furniture, of half a million of dollars.

It is one of the handsomest structures in the United States, and perhaps, of its size, in the world. It is of a square form, two stories in height, besides a basement story. It has a wing at each end, projecting from the front, and in the centre the roof is elevated, to form an attic story. The whole length of the building is 216 feet, breadth 105, height 51. Including the attic story it is 65 feet in height. The front and both ends, above the basement story, are built of native white marble, from Stockbridge, Massachusetts; the rest of the building is constructed of brown free stone. The roof is covered with copper. Rising from the middle of the roof is a cupola, on which is placed a colossal figure of

JUSTICE, holding in her right hand, which rests on her forehead, a balance, and in her left, a sword pointing to the ground. The first story, including the portico, is of the Ionic, the second of the Corinthian, the attic of the Fancy, and the Cupola, of Composite orders:

## CAPITOL AT WASHINGTON.



This spacious edifice is finely situated on an eminence, and commands not only a view of the city, but a considerable extent of the adjacent country, the heights of Georgetown &c., and the windings of the Potomac, as far as Alexandria. The following are the dimensions of the building:

| | |
|---|---|
| Length of front, | 352 feet 4 inches. |
| Depth of wings, | 121 do. 6 do. |
| East projection and steps, | 65 do. |
| West do. do. | 83 do. |
| covering 1½ acre, | 1820 do. |
| Height of wings, to top of balustrade, | 70 do. |
| Height to top of centre dome, | 170 do. |

"It is composed of white freestone, and the entire cost of it is estimated at three millions of dollars. It is surrounded by an elegant iron railing, enclosing twenty acres of ground, planted with various kinds of trees and shrubs. The north wing is occupied by the Senate; the south by the House of Representatives. There are also rooms for the Supreme Court of the United States, the National Library, and other purposes.

"The Senate and Representative halls are both finished in a style of great elegance and splendor. The latter is of semicircular form, surrounded by twenty-one massy pillars, or columns, and four pilasters of the Potomac marble, which stand upon an elevated base of freestone. The capitals of these pillars are formed of Carara marble, and are very beautiful; and there is supported by them a large dome, in the centre of which is placed an ornamental cupola, which admits the light into the hall from above. In front of the Speaker's Chair, and over the entrance into the Chamber stands an allegorical figure, formed of Italian marble, representing HISTORY, in the act of recording the proceedings of the nation. She stands on a winged car, which seems to roll over a section of the terrestrial globe, exhibiting in bas-relief the signs of the Zodiac,

The wheel of the car is intended as the face of a clock, which is to be placed behind, and the front contains in bas-relief, a figure of FAME, and a profile bust of Washington. Above the Speaker's Chair, is a colossal figure of LIBERTY, in plaster, pointing to the hall below, and supported on the right by an *American Eagle*, and on the left by the *Roman fasces*, which are partially enveloped in the folds of a serpent. Immediately under this figure, on the frieze, is carved in high relief, another eagle, in the attitude of flying. This hall has been pronounced by an intelligent English traveller, to be the most beautiful one he ever saw."

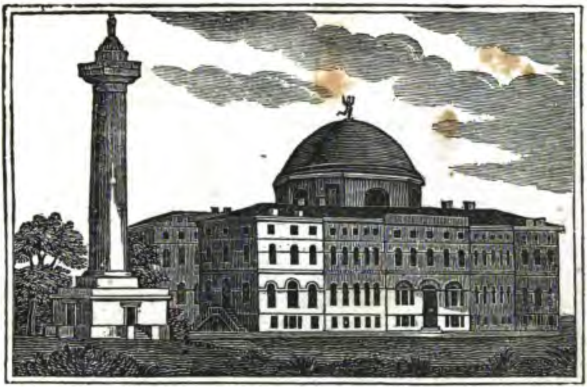
It was our design to give descriptions, similar to the above, of several other principal buildings in the United States; but want of room obliges us to present to our readers views of these buildings, without the contemplated descriptions.

PRESIDENT'S HOUSE, WASHINGTON.

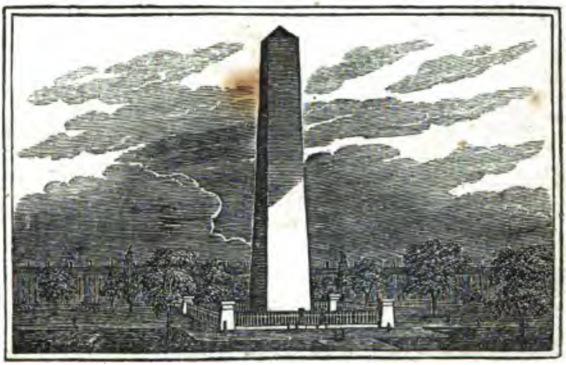
PENNSYLVANIA CAPITOL, HARRISBURGH.

ARCHITECTURE.

BALTIMORE EXCHANGE, AND WASHINGTON MONUMENT.



BUNKER HILL MONUMENT.



"In respect to Gothic style," observes Professor Silliman, (American Journal of Science and Arts, Vol. xviii. No. 2, p. 224) "our country labors under many disadvantages. Its expensive character, is in most cases far beyond our means. It flourished in Europe, at a time when the revenues of the church were princely, and no style demands such large pecuniary resources as this." Still enough has already been done among us to show that it is not an insurmountable obstacle among us. Several fine Gothic structures are to be found in the United States, a particular description of which our limits entirely forbid.

The Gothic arrangement of churches appears not quite compatible with the nature of Protestant worship. "The best form for a Protestant Church," remarks the writer above quoted, "is a rectangular parallelogram, though I have seen the circle, and other simple forms employ-

ed seemingly without any inconvenient results. But any thing like a cross, the favorite form of the Gothic, is entirely inadmissible. There is at Washington a church in the form of a Greek cross, in good taste as to its general architecture; but in consequence of its shape, a part of the congregation cannot see the minister, and the want of *fitness* in the interior is exceedingly unpleasant. Simplicity in the form of our churches, seems nearly essential—a quality entirely at variance with this style, and without something to conceal and draw attention from this plainness, their interior will appear meagre and bare. Galleries assist in doing this, but the edifice should be accommodated to them, and they to it, more than is now usually done. The windows should be so constructed, that we may feel that the gallery is not concealing their beauty from our view; and on the other hand, the gallery should not be carried in a straight horizontal line from pillar to pillar, in the manner of a Grecian entablature, but should be supported by low arches, of the third order, and should be made to preserve the Gothic character throughout. The great variety of arches and ornaments admitted by the style, will easily allow the architect to do this.

"In respect to the management of spires, our taste, it is said, is exceedingly defective. The spire itself is of Gothic origin, and may be considered as belonging to the Gothic style; with us it is applied to all species of churches. Among the Italians it is unknown, the tower alone being employed. As we go northward from Italy, the spire comes into use, and is often a most striking and beautiful object. That of the cathedral of Vienna is four hundred and sixty-five feet in height, and that of Strasburg four hundred and fifty-six; the diminution in both these, however, commences at the base, as is frequently the case in that part of the continent, and the effect is less imposing than when the tower and spire are combined. England is remarkable for happy combinations of the two, though in that nation, the tower without the spire is frequently to be seen. There are few parts of architecture in which our taste is so bad as in this. The steeple is almost uniformly thrust, and made the first and main object of our attention, no matter what the cost may be to the body of the edifice. It stands out, either wholly or in part, from the facade or front, which is thus broken up, and is incapable of receiving either majesty or beauty of expression. The facade is, obviously, every thing to the exterior of a building. On it the architect labors most; to it the other parts are made to conform, and from it the edifice receives the unity and singleness of character, which constitute what artists call a *whole*. The English architects do better. They make the steeple rise from the front of the edifice, but its lower part is not seen; the facade is left to take its full power; the church becomes the main subject of our thoughts, and the steeple is felt to be only a necessary appendage; often it is in good taste, and adds greatly to the character of the edifice.

"As to the shape of the steeple, it is thought that we err in giving too little height in proportion to the tower. The spire in England, most admired for its proportions, is one hundred and fourteen feet in height, the diameter of its base being nineteen; the tower on which it rests is seventy-five feet high, and twenty-two feet square. It would be better to banish all fishes, arrows, and every thing of the kind, every thing resembling a vane, from the top of our spires. They are no or-

nament; what can they mean? A stranger would think us wonderfully anxious about the wind: if we must have them, let them be put in some other place.

"It is seldom that the erection of our public buildings fails to be accompanied with hurry and parsimony. Our architecture has hitherto exerted itself among frail and perishable materials. The awkward wooden buildings it has erected are fast passing away, and we should be glad that it is so. But the case is hereafter going to be a different one. We are beginning to build entirely with bricks and stone, and what is hereafter to be erected, will go down to other ages to tell of our taste, and to exert its influence on theirs. Let us bear constantly in mind, then, that not one of these edifices is built for ourselves alone; let us extend our views through other generations, down to the far distant boundaries of time, and as we contemplate our works binding these ages to us, and us to them, let us indulge the feelings as our characters swell out and form themselves to this long series of years, and to this constantly thickening population. Let us remember, too, that it will be an intelligent and a keen sighted population. We wish them to respect our memory; let us show that we have respect for them; we wish them to reverence our laws and institutions, for we believe them good; let the objects we associate strongly with these laws and institutions, objects to be seen every day by them, and to influence their opinion of us, let these objects be such as to heighten reverence, at least let them be such as not to provoke their ridicule.

*Domestic Architecture.* "Dwelling houses are capable of such endless modifications, and depend so much on circumstances for their character, that it is extremely difficult to reduce them to rule, or, at all events, to bring the subject within moderate bounds. In cities, houses must be crowded, and generally of considerable height; in towns they are of less elevation, and at greater intervals; while in the country they take a still different character. We will endeavor, however, to give the subject a brief consideration. The architecture of dwelling houses should be marked by two qualities, first and mainly by convenience, and secondly by cheerfulness. The former we must leave to take care of itself. As regards the latter, a choice of one of the three ancient orders will in most cases be necessary, and on this the character of the edifice will chiefly depend. The Doric, it has already been remarked, is grave and majestic; the Ionic, cheerful and graceful;—the Corinthian, gay. If this is true, the Ionic is the most proper order for a dwelling. If the facade is large and imposing, the Roman Doric may sometimes be used for the sake of variety; but where the taste is left free to its exercise, we should always prefer the Grecian Ionic. It has a good mixture of simplicity and richness; it is pure and extremely graceful; it is, in short, just that to which we would desire all the internal arrangements, and even the manners of a family to correspond. The character of a family will generally be found to have some resemblance to the house in which they live. The Grecian Ionic does not appear well, however, in small objects; and where the dwelling is broken into a number of diminutive parts or where none can be large, the Composite or the modern Ionic may be more advantageously employed. These are frequently used in small porticoes and the like; and to them they are very well suited. The Grecian Doric *may*, perhaps, be made

to appear well in a dwelling house, but the attempt may be considered as hazardous. Its character of bold and manly grandeur, coupled with simple majesty, is not at all suited to such a building; the Corinthian errs as greatly on the other side.

"We are fond of variety in cities or towns. In the former it is more difficult than in the latter, but we often make the case even worse than our necessities require. It is so when we erect a large block of buildings, each one corresponding exactly with the rest. Why is this? Is there not uniformity enough in the constant recurrence of streets of the same breadth, and perhaps meeting at the same angle; in an unbroken range of houses, each advanced to the same line, and finished with the same proportionate number of windows and doors? But there is another consideration. In a block of this kind, the whole mass takes an unity which requires vastness in the other parts to correspond. We look for this, and find, with disappointment, the doors, windows, and porches, the same as those of any other houses; the details become more minute from a comparison with the vastness of the whole, and the discrepancy becomes more strongly forced on us, and more painful.

"Smaller cities and towns have a great advantage in the intervals which occur between the houses, and in New-England this advantage is turned to good account. The houses there are frequently built at a distance of twenty or thirty feet from each other, a space of several yards being also left between them and the street. The whole of this is planted with delicate shade trees and shrubs, and as the houses themselves are usually painted white, and have small tasteful porticoes in front, the effect is the most agreeable that can be imagined. Gentlemen who have travelled extensively in Europe, frequently inform us that they have never seen any thing that, as a whole, would compare in neatness and real beauty with some of the New-England villages; the houses, though as comfortable and durable as in other places, cost, it is believed, even less than is usual for edifices of their size.—Nearly the whole is effected by the neat little yard, with its verdure, in contrast with the pure white of the facade, and the little portico over the door. There is another characteristic in these towns, which it is desirable should become more common in the country, viz. the habit of planting trees along the streets. We should not have all the streets in a town treated in this manner; those for business should be kept clear, but in all others, trees should be planted more or less thickly, as taste or convenience will admit. They give a town the appearance of richness and comfort, which cannot be so cheaply purchased in any other manner. The elm is our most graceful shade tree, and will be found most suitable when the streets are wide; when narrow, the maple is thought to be the best.

"As to country houses and their premises, so much depends on the character of the ground, and of all objects, even to a distance of miles, that the subject swells entirely beyond our limits. We must be allowed, however to remonstrate against the warfare which is every where carried on against our noble forest trees; trees which should be estimated by us far above all price. The first thing done in the new parts of our country, when a spot is determined on for a house, is to cut down all the trees within many rods of it; and then, year by

year, the work of destruction goes on, as if the very sight of a forest tree were odious. The house stands alone in the clearing, its inmates, and particularly the children, roasted and browned under the hot summer's sun: but by and by, the nakedness and dreariness of the situation is felt, and then are planted some Lombardy poplars, 'all in a row.' Now, the trees which we cut down with such an unsparing hand, are the very kind which English gardeners cultivate with the most persevering diligence, and are planted here just as they labor most to plant. And we too shall cultivate them before long, and shall then think, with the most bitter regret, of the sad destruction which we and our ancestors have made. But in vain; for all the art of man will not be able to restore, in any length of time, such glades and thickets, and lawns, as we now possess. When about to build in a new country, we should save, near our house, an acre or two of the forest, and should guard it with the most watchful care. Morning, noon, and evening, it would be an agreeable retreat; its shade would be refreshing in our scorching heats; it would connect us in some measure, with ages long since gone, and bring before us the wild, but high-souled Indian, his council, his battle song, the war, the chase, the feast and dance; its noble and manly form would gratify our taste; it would raise our thoughts to Him who is 'a shadow from the heat, a strength to the needy in his distress.' Let us then spare our noble forest trees. Many political considerations might be adduced to shew the imprudence of our rude havoc among them, but for these we have not room."

# PART V.

## AGRICULTURE.

Agriculture, considered as a science, explains the means of making the earth produce, in plenty and perfection, those vegetables which are necessary to the subsistence, or convenience of man, and of the animals reared by him for food, or labor.

Considered as an art, every human being has an interest in it, since it is the foundation of all other arts—the basis of civilization and refinement—and essential to the existence of some of the nations which inhabit certain portions of our globe.

Besides the healthfulness of the pursuit, agriculture "is intimately connected"—to use the language of a distinguished literary journal* of our country—"with our national character, because it powerfully acts upon the morals and constitution of our citizens. If it be true that the

* North American Review.

torch of liberty has always burned with a purer and brighter lustre on the mountains than on the plains, it is still more true, that the sentiments of honor and integrity more generally animate the rough, but manly form of the farmer, than the debilitated body of the artisan. There is in that primitive and honorable occupation, the culture of the earth, something which, while it pours into the lap of the State an increase beyond every other employment, gives more than the fabled stone, not only a subsistence, but a placid feeling of contentment; not only creates the appetite to enjoy, but guarantees its continuance, by a robust constitution, fortified with the safe-guards of temperance and virtue."

To this we may add a remark of Adam Smith, in his Wealth of Nations, viz. that "the capital employed in agriculture not only puts in motion a greater quantity of productive labor, than any equal capital employed in manufactures; but, also in proportion to the productive labor which it employs, it adds a much greater value to the annual produce of the land and labor of the country, while it increases the real wealth and revenue of its inhabitants."

Notwithstanding these high testimonials—and a hundred more equally weighty might be adduced—in favor of the profession of agriculture, it has been, until within a few years, "a degraded and unpopular pursuit among us." In Europe, the fact has been otherwise. In England and on the continent, every state, since the peace of Aix-la-Chapelle, has turned its assiduous attention to this most important department of domestic economy, and ultimately borrowed from it the resources which have carried them through the prodigious conflicts of the last generation.

Several causes have contributed to lessen the apparent importance of agricultural skill in the United States. But two only can here be noticed.

The first is the peculiar situation of Europe since the peace of '83, which has afforded opportunities for commercial enterprise, too tempting to be resisted. "American merchants received in the lapse of a very few years, the most astonishing accessions of wealth: and fortunes ordinarily the fruit of a laborious life, and never the portion of many, were amassed with unparalleled rapidity, and by large numbers. Our domestic prosperity more than equalled the extension of our trade. It was then that the compting-houses of our merchants were filled with youth from the country, who forsook the slower but surer emoluments of agriculture, for the mushroom, but unsubstantial fortunes of commerce; nay, who preferred the meanest drudgery behind the counter of a retailer, to the manly and invigorating toil of the cultivator of his paternal acres. Unfortunately this spirit of migration was encouraged by too great a success in trade. Feelings of vulgar pride contracted in town, caused the manual labor of the farmer to be regarded as degrading. This unworthy sentiment spread its baleful influence; and when the compting-houses became overstocked, and afforded no longer a resource, it was no uncommon thing to see a young man, with no qualifications but a little bad Latin, picked up at a miserable village school, forsake a large and comfortable farm, and apprentice himself to a poor country attorney."

The second cause of the late depressed state of agriculture in the

United States, especially in New-England, has been owing to the constant emigration to the West. No sooner had the farmer reduced his land by successive crops, than he removed to a country which offered him an untouched surface, needing for some years no aid of composts and manures.

But it is occasion of gratitude, that, at length, the importance of a regular and more enlightened, and more energetic system of farming is beginning to be felt in our country. Men of talents, wealth, and distinction, no longer think it beneath them to enrol their names on the list of *practical* farmers. By means of agricultural associations, and liberally patronized and ably conducted papers, information on the subject, considered both as an art, and a science, is rapidly spreading abroad—a taste for farming is diffusing itself, and ere long it is believed that this species of employment will be as much prized and coveted, as once it was considered low and despicable.

To aid in advancing the interests of this important branch of national industry, will be the object of the pages which we design to appropriate to this subject.

## SECTION I.

### DIFFERENT BREEDS OF NEAT CATTLE IN GREAT BRITAIN AND THE UNITED STATES.

I. The Wild Cattle—of a bull of which race the above is a portrait—were the original stock of the kingdom of Great Britain, before enclosures were known. They are said to be still found at Chartley Park, in Derbyshire, and perhaps in one or two more; but it is believed that the only pure breed is that preserved, in a wild state, at Chillingham Castle, in Northumberland, the seat of the Earl of Tankerville, whose steward, Mr. Bailey, thus describes them:

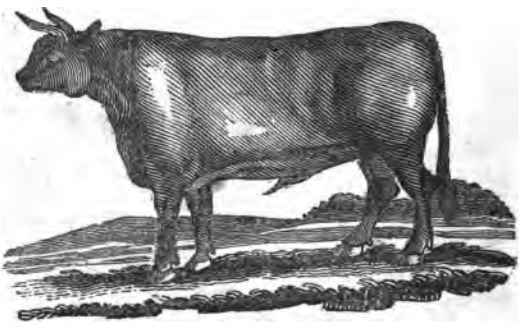
" Their color is invariably white, muzzle black; the whole of the inside of the ear, and about one-third of the outside, from the tip down-

wards, red; horns white, with black tips, very fine and bent upwards. Some of the bulls have a thin upright mane, about an inch and a half or two inches long; the weight of the oxen is from thirty-five to forty-five stone, of fourteen pounds; and that of the cows, from twenty-five to thirty-five stone the four quarters. The beef is finely marbled, and of excellent flavor.

"The mode of killing them was, perhaps, the only modern remains of the grandeur of ancient hunting. On notice being given that a wild bull would be killed upon a certain day, the inhabitants of the neighborhood came in great numbers, both horse and foot; the horsemen rode off the bull from the rest of the herd, until he stood at bay, when a marksman dismounted and shot. At some of these huntings, twenty or thirty shots have been fired before he was subdued; on such occasions the bleeding victim grew desperately furious from the smarting of his wounds, and the shouts of savage joy that were echoing on every side. From the number of accidents that happened, this dangerous mode has been seldom practised of late years; the park keeper generally shooting them with a rifle gun at one shot.

"When the cows calve, they hide their calves for a week or ten days in some sequestered situation, and go and suckle them two or three times a day. If any person come near the calves, they clap their heads close to the ground, and lie like a hare, in a form to hide themselves. This is a proof of their native wildness, and is corroborated by the following circumstance that happened to the writer of the narrative, who found a hidden calf two days old, very lean and very weak; on stroking its head, it got up, pawed two or three times, like an old bull, bellowed very loud, retired a few steps, and bolted at his legs with all its force; it then began to paw again, bellowed, stepped back and bolted as before; but knowing its intention, and stepping aside, it missed him, fell, and was so weak that it could not rise, though it made several efforts; but it had done enough; the whole herd were alarmed, and coming to its rescue, obliged him to retire; for the dams will allow no person to touch their calves, without attacking him with impetuous ferocity.

"When any one happens to be wounded, or grown weak or feeble through age or sickness, the rest of the herd set upon it and gore it to death."



II. The Devonshire Breed, delineated above, is supposed to have

descended directly from the wild race. It is found in its purest state in North Devon; in the agricultural report of which district its peculiar qualities are thus described by the late Mr. Vancouver;—

"Its head is small, clean and free from flesh about the jaws; deer-like, light and airy in its countenance; neck long and thin; throat free from jowl or dewlap; nose and round its eyes of a dark orange color; ears thin and pointed, tinged on their inside with the same color that is always found to encircle its eyes; horns thin and fine to their roots, of a cream color, tipped with black,* growing with a regular curve upwards, and rather springing from each other; light in the withers, resting on a shoulder a little retiring and spreading, and so rounded below as to sink all appearance of its pinion in the body of the animal; open bosom, with a deep chest, or keel; small and tapering below the knee, fine at and above the joint, and where the arm begins to increase it becomes suddenly lost in the shoulder; line of the back straight from the withers to the rump, lying completely on a level with the pin or huckles, which lie wide and open; the hind quarters seated high with flesh, leaving a fine hair-ham, tapering from the hock to the fetlock; long from rump to huckle, and from the pinion of the shoulder to the end of the nose; thin loose skin, covered with hair of a soft and furry nature, inclined to curl whenever the animal is in good condition and in full coat, when it also becomes mottled with darker shades of its permanent color, which is that of a bright blood red, without white, or other spots, particularly on the male: a white udder is sometimes passed over, but seldom without objection.

"This description may be considered as a summary of the perfections as to the exterior appearance of the animal; what under the same head, may be regarded as defects, appear first in the sudden retiring of the vamp from behind the huckle to a narrow point backwards; the great space between the huckle and first rib; the smallness of the angle inwards, at which the ribs appear to be projected from the spine or backbone, often giving the appearance of a flat-sided animal, and in its being so much tucked up in the girth as to show an awkward cavity between the keel and navel, the line of which, it is presumed, should always be found to hold a position as nearly as possible parallel with that of the back from the withers to the loin. The animal is, however, generally well grown, and filled up behind the shoulder.

III. The Sussex Breed differs but little from the Devonshire; when pure, the cattle are invariably dark red: and those which are marked with a mixtue of either white or black, although passing under the denomination of *Sussex*, are always crossed with foreign blood. In other

* The late Rev. Arthur Young, formerly Secretary to the Board of Agriculture, describes thorough bred Devons as of a bright red, neck and head small, eye prominent, and round it a ring of bright yellow; the nose round the nostril having the same color; the horn clear and transparent, upright, tapering, and gently curved, but not tipped with black.

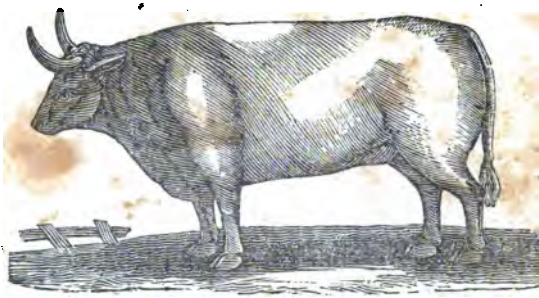
respects they are thus described by an eminent breeder, the accuracy of whose judgment has been confirmed by many intelligent graziers.

"A thin head, and clean jaw; the horns pointing forward a little and then turning upward, thin, tapering and long; the eye large and full; the throat clean, no dewlap; long and thin in the neck; wide and deep in the shoulders; no projection in the point of the shoulder, when looked at from behind; the fore legs wide; round and straight in the barrel; and free from a rising back bone; no hanging heaviness in the belly; wide across the loin; the space between the hip bone and the first rib very small; the hip bone not to rise high, but to be large and wide; the loin, and space between the hips to be flat and wide, but the fore part of the carcass round; long and straight in the rump, and wide in the tip; the tail to lay low, for the flesh to swell above it; the legs not too long; neither thick nor thin on the thigh; the leg thin; shut well in the twist; no fullness in the outside of the thigh; but all of it within; a squareness behind, common in all long horned beasts, greatly objected to; the finer and thinner in the tail the better.

"Of these points, the Sussex beasts are apt to be more deficient in the shoulder than in any other part. A well made ox stands straight, and nearly perpendicularly, on small clean legs; a large bony leg is a very bad point, but the legs moving freely, rather under the body than as if attached to the sides; the horns pushing a little forward, spreading moderately and turning up once. The horn of the Devonshire, which very much resembles the Sussex, but smaller and lighter, is longer, and rises generally higher. The straightness of the back line is sometimes broken in very fine beasts, by a lump between the hips."

On a comparison between the Devon and Sussex breeds, the former has been considered by competent judges as thinner, narrower, and sharper than the latter, on the top of the shoulder, or blade bone; the point of the shoulder generally projects more, and they usually stand narrower in the chest; their chine is thinner and flatter in the barrel, and they hang more in the flank; but they are wider in the hips, and cleaner in the neck, head, and horns, and smaller in the bone, than the Sussex; their hides are thinner and softer, and they handle as mellow.

The distinction between them, however, is not very striking; they are equally profitable to the grazier, and as working cattle, they both stand unrivalled.



IV. The HEREFORD BREED is a variety of the Devon and Sussex, but is larger and weightier than either; being generally wider and fuller over the shoulders or chine, and the breast, or brisket, as well as in the after part of the rump. The prevailing color a reddish brown, with white faces; the hair fine and the skin thin.

In the true bred Hereford cattle, there is no projecting bone in the point of the shoulder, which in some breeds forms almost a s[illegible] against which the collar rests; but on the contrary, tapers off; they have a great breadth before, and are equally weighty in their hind quarters; the tail set on high; a great distance from the point of the rump to the hip bone; the twist full, broad and soft; the thigh of the fore legs to the pastern joint tapering and full, not thin, but thin below the joint; the horn pushes aside a little, and then turns up thin and tapering; remarkably well feeling; mellow on the rump, ribs, and hip bone. The quality of the meat not hard, but fine as well as fat; little coarse flesh about them, the offal and bone being small in proportion to their weight; whilst their disposition to fatten is equal, or nearly so, to that of any other breed in the island. They are, however, ill calculated for the dairy; their constitutional disposition to accumulate flesh being in opposition to the qualities of good milking cows, an observation which will equally apply to every breed when similarly constituted. A breed of cattle, equally adapted to the shambles, the dairy, and the plough, is indeed not to be met with; and experience teaches that these properties are inconsistent with each other. The Hereford cattle are, by many good judges, considered to approach nearest to that perfect state of any of the large breeds: they arrive early at maturity, and are fit to labor; but it is as fatting stock that they excel, and it is a different variety of the same breed that is preferred for the dairy. There is, indeed, a more extraordinary disproportion between the weight of Herefordshire cows, and that of the oxen bred from them, than is to be found in any other of the superior breeds; they are comparatively small, extremely delicate and light fleshed, and it is said that they are not unfrequently the mothers of oxen, nearly three times their own weight.

NEAT CATTLE.

On comparison with the Devon and Sussex, the Hereford breed will probably not be found equally active and hardy in the yoke; but it is generally considered to exceed them in the quality of fattening; and when compared with any other breed, it may fairly rank at least among the very best in the country.

V. The Short Horned Cattle, under which denomination are indiscriminately included the *Dutch*, *Holderness*, and *Teeswater breeds*, are supposed to have acquired the appellation of Dutch, from a cross with some large bulls that were imported, near a century ago, from Holland, into Yorkshire, (Eng.) in the east and north ridings of which county the two latter had been long established. It has, however, been doubted whether any advantage was derived from this intermixture; for the increase thus obtained in size, was thought to have been counterbalanced by a more than proportionate increase of offal. But fortunately, the error was not universal; for some intelligent breeders, aware, even at that day of the superiority of symmetry to bulk, preserved the breed, of which they were already in possession, in its native purity; and it is from some of that stock, so maintained, that the present improved short horned cattle, now generally distinguished as the *Durham* or *Yorkshire breed* are descended.

This breed was introduced about forty years ago, by Messieurs Colling of Darlington, and has rapidly risen in the public estimation. The cattle are very large, and are beautifully mottled with red or black upon a white ground; their backs level; throat clean; neck fine; carcass full and round; quarters long; hips and rumps even and wide; they stand rather high on their legs; handle very kindly; are light in their bone, in proportion to their size; and have a very fine coat, and thin hide. They differ from the other breeds, not only in the shortness of their horns, but as being wider and thicker in their form, and consequently feeding to greater weight; in affording the greatest quantity of tallow when fatted; and in having very thin hides, with much less hair upon them than any other kind except the Alderneys. They also possess the valuable properties of fattening kindly at an early age, and of yielding large quantities of milk; but the quality of the latter is not so rich as that of some other species.

Of this breed, Mr. Charles Colling, of Ketton, sold a bull—*Comet*, by public auction, in the year 1810, for the extraordinary sum of one thousand guineas; and the history of the celebrated *Durham ox*, the property of the same gentleman, is too remarkable not to merit attention.

He was bred in the year 1796, and at five years old was not only covered thick with fat upon all the principal points, but his whole carcass appeared to be loaded with it, and he was then thought so wonderful an animal, that he was purchased in February, 1801, for £140, to be exhibited as a show: his live weight being then 226 stone, of 14 pounds. In the following May he was again sold for £250 to Mr. John Day, who, two months afterwards refused for him two thousand guineas. He was exhibited in the principal parts of the kingdom until April, 1807, when he was killed in consequence of having accidentally dislocated his hip in the previous February, and although he must have lost considerably in weight during his illness, besides the disadvantages of six year's travelling in a caravan, yet his carcass weighed 187 stone 12

pounds; and Mr. Day stated his live weight at ten years old, to have been 270 stone.

Uncommon as this animal then was, he has, however, been since exceeded in size by a Yorkshire ox, bred by Mr. Dunhill, of Newton, near Doncaster, the carcass of which, weighed, when killed, 246 stone 12 pounds; and he was supposed to have lost near forty stone while being exhibited in London.

Still more recently another beast of uncommon size, fed by Lord Yarborough, has been exhibited under the title of "*the Lincolnshire ox:*" but though bred in that county, from a favorite cow belonging to Mr. Goulton, he was got by a descendant of Comet, out of Countess, also of the Durham breed. This extraordinary animal measured five feet six inches in height, at the shoulders, eleven feet ten inches from the nose to the setting of the tail, eleven feet one inch in girth, and three feet three inches across the hips, shoulders, and middle of the back; the lowest point of his breast was only fourteen inches from the ground, and he stood one foot ten inches between the fore legs; the girth of the fore leg was nine inches.

The variety of this breed known as the Yorkshire Polled Cattle only differs from those already described, in being without horns; they are in considerable estimation among the London cow-keepers, as milkers, and at the same time maintain their flesh in a state nearly fit for the shambles.

It may not be improper in this place to give some account of several remarkable oxen raised in the United States,—the land in which, it is a current opinion on the other side of the water, animals of every description are wont to degenerate.

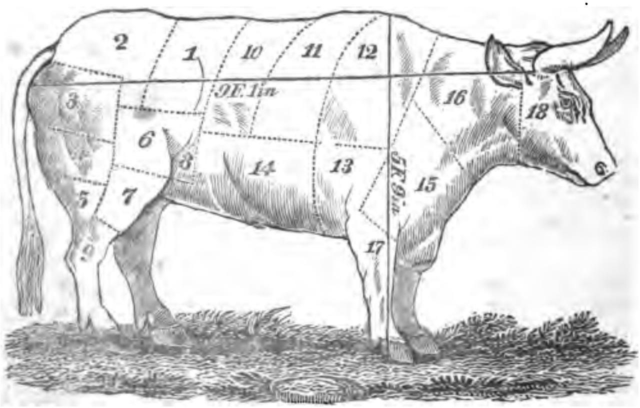
The first ox we notice has been exhibiting for several years in different parts of the country. He is called "Mammoth Ox Columbus." He was bred in the town of Greenland, State of New-Hampshire. By competent judges he is supposed to weigh alive nearly 4000 pounds. His dimensions are as follows:—

| | *feet.* | *inches.* |
|---|---|---|
| Length from the nose to the rump. | 11 | 00 |
| Height, | 5 | 10 |
| Girth around the body, | 11 | 6 |
| Shoulder to the brisket, | 4 | 6 |
| Horns from tip to tip, | 3 | 3 |

In the spring of 1819, two oxen of extraordinary weight and dimensions, were slaughtered in Baltimore. The one of these was called "Columbus," the other "the Delaware ox." The weight and dimensions ascertained with great care and exactness, follow

NEAT CATTLE.

| COLUMBUS. | *Weight.* | DELAWARE OX. | *Weight.* |
|---|---|---|---|
| Alive, | 2962 | Alive, | 2688 |
| Head and tongue, | 24½ | Head and tongue, | 23 |
| Feet, | 26 | Feet, | 22½ |
| Liver, | 18 | Liver, | 20¾ |
| Heart, | 10 | Heart, | 10¾ |
| Lights, | 16 | Lights, | 11 |
| Rough tallow, | 218 | Rough tallow, | 273½ |
| Hide, | 154½ | Hide, | 101 |
| Blood, | 94 | Blood, | 65½ |
| Other offal weight, | 222½ | Other offal weight, | 198 |
| | 783½ | | 731½ |
| Neat beef, | 2090 | Neat Beef, | 1851 |
| | 2873½ | | 2582½ |
| Loss unaccounted for, | 88½ | Loss unaccounted for, | 105½ |
| | 2962 | | 2688 |




OX COLUMBUS.

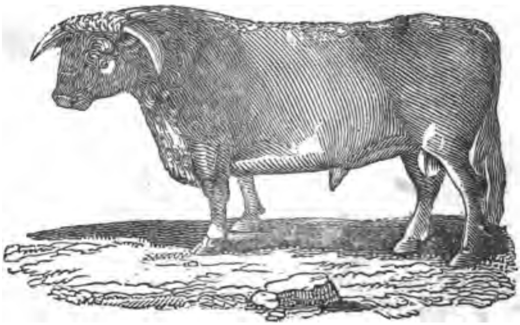
*Hind Quarter.*

1 Sirloin,
2 Rump,
3 Edge bone,
4 Buttock,
5 Mouse Buttock,
6 Veiny Piece,
7 Thick Flank,
8 Thin Flank,
9 Leg,
10 Fore rib; five ribs,

*Fore Quarter.*

11 Middle rib; four Ribs,
12 Chuck; three Ribs,
13 Shoulder, or Leg of Mutton piece.
14 Brisket,
15 Clod,
16 Neck, or Sticking piece,
17 Shin,
18 Cheek.

The preceding drawing represents the form and attitude of the ox Columbus. The *plain horizontal line*, describes his length from the root of the horn to the tip of the rump. The plain *perpendicular line*, his height on the shoulders. The *dotted lines*, point out the manner of *cutting up* beef as practised by victuallers; and the *figures* in the centres, refer to the proper technical *name* of each piece. For this diagram we are indebted to the American Farmer. It is given in this place as a *pattern*, which may be useful as a guide to housekeepers, in many parts of our land.



VI. The Long Horned Cattle are descended from a breed which has long been established in the Craven district, in Yorkshire, (Eng.;) some cows of which race, and a Lancashire long horned bull, of the kind delineated above, were brought, early in the last century, by a Mr. Webster, to Canley, in Warwickshire, where they produced a stock that soon became remarkable for its beauty.

Of this *Canley stock*, the late Mr. Robert Bakewell, of Dishley, in Leicestershire, procured some cows which he crossed with a Northumberland bull, and thus reared that celebrated race now so well known as the *Dishley breed.* They were long and fine in the horn, had small heads, clean throats, straight broad backs, wide quarters, and were light in their bellies and offal; and probably from the effect of domestication and gentle treatment, remarkably docile; they grew fat upon a smaller proportion of food than the parent stock; but gave less milk than some other breeds; and the chief improvements effected seem to have been, in their aptitude to fatten early on the most valuable points, and in the superior quality of the flesh.

The modern improvements made in the long horned cattle, since the first attempts of Bakewell, are considered to consist chiefly in the coarser parts having been reduced, and the more valuable enlarged. The present breed is finer boned and finer in the neck, throat, and breast; the back is straight, wide, and well covered with flesh; the rump is also wide, and particularly fleshy on the points, and about the root of the tail. Even when only in store order, the flank feels thick and fleshy, and in every part the animal handles loose and mellow.

These, indeed, were always the distinguishing points of these cattle; but they were not thought attainable except they were fed on the richest pasture. This, however, has proved to be an error; for not only are they found on land of no extraordinary quality, but it even appears to be generally admitted, that well-bred cattle will do better on ordinary food than those of an inferior kind; it was indeed asserted by Bakewell, that this breed kept themselves in good condition on less food than any other of equal weight; an opinion that seems to have been fully justified by the large prices that have been repeatedly given for the stock.

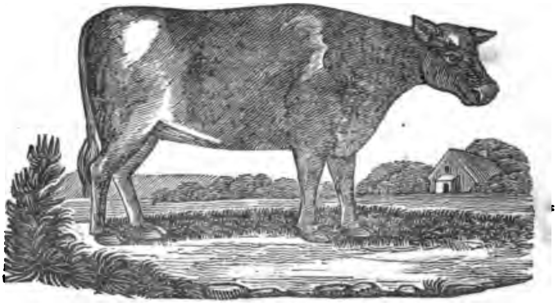
At a sale of Mr. Fowler's stock (of this breed) at Little Rollright, in Oxfordshire, in 1791, fifteen head of oxen, five bulls and ten cows, were sold for various sums, amounting to £2464, or upon an average, at £163, each. The finest bull, named Sultan, only two years old, produced *two hundred and ten guineas;* and Washington, another of the same age, was sold for *two hundred and five guineas;* while Brindled Beauty, a cow, brought the sum of *two hundred and sixty guineas;* but at a subsequent sale of stock belonging to Mr. Paget, in 1793, Shakspeare, a bull bred by Mr. Fowler from a grandson of Mr. Bakewell's famous bull, Twopenny, and a cow of the Canley blood, was disposed of for *four hundred guineas.*

At a still later period, Mr. Princep, of Croxhall, in Derbyshire, is said to have refused £2000 for twenty long horned dairy cows, and 1500 guineas for the use of his best bull to thirty cows.

Large as these prices were, they have however been exceeded by those actually obtained for short horned cattle. At the sale already alluded to, of Mr. Charles Colling's stock at Ketton, in the county of Durham in 1810, seventeen cows and eleven bulls produced £4918; being an average of £175 10*s.* each. Of these, two cows, Countess and Lily, both got by Comet, were sold, the one for *four hundred,* and the other for *four hundred and ten guineas.* Petrarch, a bull by Favorite, the sire of Comet, brought *three hundred and sixty-five guineas,* and Comet himself *one thousand.*

Still more recently, however, in February, 1827, at a great sale of stock, the property of Mr. Rennie of Phantassie, in East Lothian, (which amounted to the large sum of £13,582,) the highest price obtained for the bull of this breed was £115 10*s.* and for a cow £63; but, as not more than half the stock on the farm was supposed to have been sold, it is probable that some of the best cattle were reserved. Many other instances might however be adduced to prove—not that the relative value of the short horned cattle has declined—but that extravagant prices are not now so generally given for superior stock as formerly.

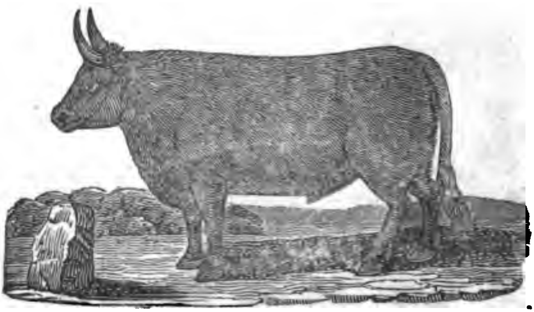
VII. The Galloway Breed derives its appellation from the county of the same name, where, and also in some parts of the Lowlands of Scotland, these cattle are chiefly reared, and whence vast numbers are annually sent to Norfolk, and other English counties to be fattened for the markets. In general, they are black, or dark brindled; are without horns, except occasionally a small excrescence resembling them, and are rather under the medium size, being smaller than the Devons, though in some other respects resembling them, yet considerably larger than the north, or even the west Highlanders.



A true Galloway bullock is straight and broad in the back, and nearly level from the head to the rump; closely compacted between the shoulders and ribs, and also betwixt the ribs and the loins; broad at the loins, but not with hooked or projecting knobs. He is long in the quarters, but not broad in the twist; deep in the chest, short in the leg, and moderately fine in the bone; clean in the chop, and in the neck. His head is of a moderate size, with large rough ears, and full but not prominent eyes, and he is clothed in a loose and mellow, though rather thick skin, covered with long, soft, and glossy hair.

In roundness of barrel, and fullness of ribs, the Galloway cattle may perhaps vie with even the most improved breeds. Their breadth over the hook bones is not, indeed, to be compared to that of some of either the short or long horned, but their loins bear a great proportion in width to the hook bones, and they are shorter between the hooks and the ribs, which is in itself a valuable point, when accompanied with length of body. They are, however, rather coarse in the head and neck, and though short in the leg, are generally fine in the bone.

Of this breed there is a variety termed SUFFOLK DUNS; they are also polled, but possess a little of the beauty of the original stock, and are chiefly remarkable for the abundance of milk given by the cows.



VIII. The HIGHLAND BREED of Horned Cattle, are chiefly reared in

the western parts of Scotland. Their horns are usually of a middle size, bending upwards, and their color is generally black, though sometimes brindled, or dun. Their hides are thick, and covered with long hair of a close pile, which nature seems to have intended as a protection against the severity of the climate under which they are bred, for they lose much of this distinction when reared in this country. In other respects, they are not unlike the Galloway breed, many of whose best qualities they possess, and more particularly their hardness of constitution, it being repeatedly proved that they will thrive with such food and treatment as no tender cattle could endure; but from being mostly bred in more exposed and mountainous situations, they rarely attain equal size.

Of this breed, there are several distinct varieties, of which the principal are the Kyloes—a short horned breed, so named from the district of Kyle, in Ayrshire,—which are chiefly esteemed for the superior quality of the milk given by the cow: the *Argyleshire*, *Dunlops*, *Western Kyloes* or *Isle of Sky*, *Norlands*, *&c.*

IX. The WELSH BREED are chiefly black, slightly marked with white, and have thick horns, of a medium length, curving upwards. They are small and short in the leg, but well proportioned, and clean, though not small boned, with deep barrelled bodies, and thin short haired hides. They are very quick feeders, and make excellent beef, and the cows are generally good milkers. The best kinds of this race of cattle are principally bred in the counties of Cardigan and Glamorgan, and in the southern and midland English counties, where they are in considerable demand for stocking inferior pastures. There is, however, a larger breed, of a brown color intermixed with white, and also having white horns; but they are long in the leg, thin in the thigh, and narrow in the chine. They are neither so compact as the black cattle, nor do they fatten so kindly, or make such good beef; but though not in esteem with the grazier, they are active, and well adapted for the yoke.

X. The ALDERNEY BREED are so named from the island on the coast of Normandy, whence they were first imported, although they are also bred in the neighboring islands of Guernsey and Jersey. They are small sized; color light red or dun, mottled with white; horns short, and bone fine. As fatting cattle, they have but few good points; being thin and hollow in the neck, hollow and narrow behind the shoulders, sharp and narrow on the hucks, light in the brisket, and lean on the chine, with short rumps and small thighs; but their flesh is fine grained, high colored, and of excellent flavor. They are also very large in the belly; but this as well as some of the points already mentioned, is rather an advantage to milch cows, to which purpose the stock is usually applied in England; and their udder is well formed.

The Alderney cows are very rich milkers; and both on that account, and because of a certain neatness in their appearance, notwithstanding the defects in their shape, they command high prices. They are, therefore, mostly in the possession of gentlemen, who rarely keeping a regular breeding stock, the cows are consequently crossed by any neigboring bull, and thus the pure breed is preserved in the hands of but very few persons.

Such are the chief breeds of neat cattle in Great Britain; and the

description being taken from the best authorities, may be considered as accurate as possible, in a *general view*.

We shall next proceed to speak of several varieties found in the United States.

Neat cattle were originally imported by our ancestors from England. They consisted of the Devonshire breed. In this opinion the late Timothy Pickering, of Massachusetts, and John Hare Powell, two gentlemen who, within a few years, have written largely on the best mode of improving our stock, both unite. It was also the remark of the late Mr. Jay, soon after his return from Great Britain, in 1795, that the cattle which he had generally seen in New England, appeared to be of the Devonshire breed that he had seen in Great Britain.

Towards the conclusion of the last century, several cattle were imported by Charles Vaughan and a Mr. Stuart; but on the New England stock, at large, it is not probable that any effect was produced by these importations. Some traces of their progeny, it is thought might be noticed in the neighborhood of Boston; perhaps in Vermont, whither some of the above stock were sent, and in Maine, where, according to the testimony of Mr. Powell, some of Mr. Vaughan's stock were driven.

Although the original breed introduced into this country by our ancestors, was that of the Devon, it is probable that some other breeds were also introduced by them; particularly the Herefordshire breed. On this point, Mr. Pickering observes, "Although I suppose the Devon race of cattle to be *predominant* in New England, I doubt not that some of other breeds were early introduced by our ancestors; some Herefords unquestionably, whose descendants are yet distinguished by their white faces." A white face, or, as Mr. Marshall terms it, "a bald face," is esteemed characteristic of the true Hereford breed.

The importation of cattle from England ceased at an early period after the settlement of the country. The Editors of the Massachusetts Agricultural Journal assume it as probable that few cattle, if any, were imported after 1650.

From that period, until towards the close of the last century, few, if any importations were made, and for the reason, probably, that the improvements in the breeds of English cattle, which had, for a half century, been going on in Great Britain, had not attracted the notice of our countrymen, owing chiefly to the depressed state of agriculture among us.

Should it be asked, what was the general character of the neat cattle introduced by our ancestors into America, we reply, in the language of the Editors of the Massachusetts Agricultural Journal: "It is well known that the agriculture of England was then in a low state, compared with its present condition. Successions of crops were nearly unknown; root crops for winter fodder were, we believe, entirely so. The prices of cattle were small, no great encouragement had been given to improve the breed. It is probable, therefore, that the cattle imported were not of a very improved race."

"On the other hand," continues the above journal, "there can be no doubt, that our climate and pastures are well adapted to the preser-

vation of cattle, in as good a state as when imported, and rather to improve them. This we infer from the *fact* that they are so fine, rather than from any general reasoning derived from our climate, and soil; and still less from our treatment of them. If we regarded those only, we should say, that the heat of our summers, and the length and severity of our winters, were unfavorable to an animal impatient of great heat and severe cold, and thriving much better on green succulent food than on dry meadow hay.

"It may perhaps be matter of surprise, that our horned cattle have been preserved as perfect as they are, considering the little attention which, for more than a century, was paid to them. That the cattle of England, at the present time, are far superior to our own, as a body, can scarcely be questioned. Great attention has been paid, in that country, to the improvement of horned cattle; and strange, indeed would it be, if the efforts of more than half a century had been without effect."

Within a few years, an interesting controversy was carried on between two gentlemen of great distinction, as enlightened and patriotic agriculturists—Col. Pickering, and Col. Powell, to whom we have already referred.

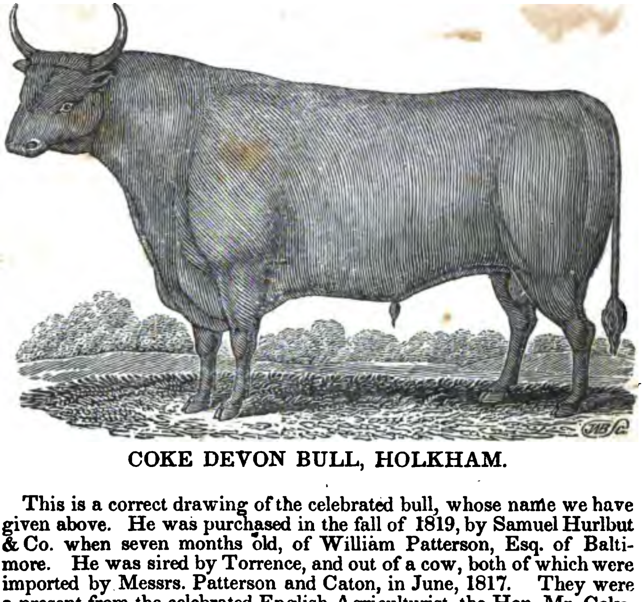
Under a conviction of the superiority of the English breeds of cattle, especially the improved short horns, the latter gentleman had, at much trouble and expense, introduced several of that species into the country. Others, also, with similar views, had taken a similar course; and several importations had, from time to time been made, of different foreign breeds, under the impression that our native breeds of cattle might be more speedily raised in their qualities, by crossing with the above, than to select only the best of our native breeds, and improve upon them.

The views of Col. Pickering were different. In a communication to the Editor of the New England Farmer, on the subject of improving our native breed of cattle, Mr. Pickering remarks: "Were but two or three farmers, in every township in the state, to turn a zealous attention to it, the object would in a few years be accomplished—whereas, half a century or more might elapse, before a general improvement by foreign crosses would be effected. It remains, too, to be ascertained, whether any other breeds really deserve the preference, in New England, to our native race, improved as it may be, and in so much less time, than will be possible, by means of a small number of imported cattle."

The controversy between these two gentlemen, growing out of their difference of opinion, was conducted with great ability, and numerous facts were collected, which had an important relation to the different positions which the respective gentlemen had taken. It is not the design of the editor of this work to estimate the merits of either view of the subject, with reference to a settlement of the question involved. The reader will find the papers relating to this controversy, in the third and fourth volumes of the New England Farmer, and an able review of the controversy by the enlightened Editor of that paper, in the latter volume, uncommonly interesting and instructive.

It was our design to introduce to our readers, notices of several of the most celebrated animals which have been imported into this country

within a few years, with reference to an improvement of our breed of neat cattle. But, not being able to obtain portraits of them, we must content ourselves, in this edition, with a brief notice of only the two following:



COKE DEVON BULL, HOLKHAM.

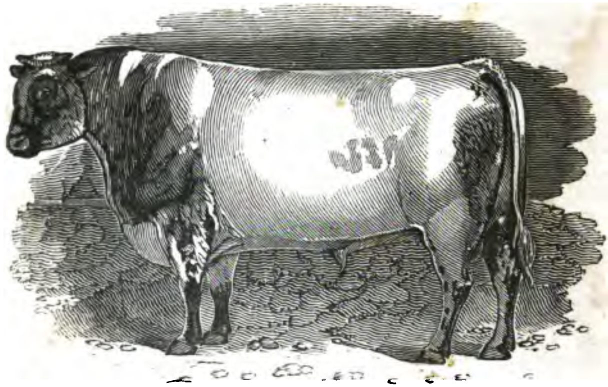
This is a correct drawing of the celebrated bull, whose name we have given above. He was purchased in the fall of 1819, by Samuel Hurlbut & Co. when seven months old, of William Patterson, Esq. of Baltimore. He was sired by Torrence, and out of a cow, both of which were imported by Messrs. Patterson and Caton, in June, 1817. They were a present from the celebrated English Agriculturist, the Hon. Mr. Coke, Member of Parliament from Norfolk. Much of the fine Devon stock in this country has been derived from the above bull.

WYE COMET.

Following is a portrait of the thorough bred Improved Durham short horned bull, *Wye Comet*, from an original painting, by Fisher, in the possession of Henry Watson, of Windsor, Conn. to whom the Editor is indebted for a full pedigree of the animal, but which want of room must exclude.

Wye Comet was begotten in England, but was calved in the United States, in November, 1822. His sire was *Blaize*, dam, White Rose, by Warrior (bred by Charles Champion, Esq.) g-d. by M[illegible]ason's *Charles*; gr. g-d. by *Prince*; gr. gr. g-d. by Neswick.

White Rose, the dam of Wye Comet, was imported by John S. Skinner of Baltimore, in the spring of 1822, by whom she was sold to the Hon. Edward Lloyd, of Maryland. Wye Comet was sold in 1823, by



WYE COMET.

the latter gentleman to John Hare Powell, Esq. of Philadelphia; and in 1826, was purchased for the sum of $500, by Messrs. Ward Woodbridge and Henry Watson, Esqs. of Connecticut, to whose patriotic exertions, and pecuniary sacrifices, the county of Hartford is indebted for much of its fine stock of various descriptions, for which it is becoming justly celebrated.

### ON BUYING AND STOCKING A FARM WITH CATTLE.

In stocking a farm, the first object should be to consider the amount of stock which the farm will keep, and keep in *good condition;* as it is not only highly disreputable to a farmer, but injurious to his interests, to keep a stock of meagre, half starved cattle.

This point being settled, regard should next be had to the *kind* of stock which is desirable; and this will be determined by considering whether you wish to rear cattle for the *fair*, or for *supplying the market.*

These two particulars being settled, the farmer should consider the following things:

I. *Beauty*, or *symmetry of shape;* in which the form is so compact, that every part of the animal bears an exact consistency, while the carcass should be deep and broad, and the less valuable parts (such as the head, bones, &c.) ought to be as small as possible. The carcass should be large, the bosom broad, and chest deep; the ribs standing out from the spine, both to give strength of frame and constitution, and likewise to admit of the intestines being lodged within the ribs; but yet not so much as to be what is called *high ribbed*, as the butchers consider it an indication of deficiency in weight of meat. Further, the shoulders ought not only to be light of bone, and rounded off at the lower point, but also broad, to impart strength, and well covered with flesh. The back also

ought to be wide and level throughout; the quarters long, the thighs tapering and narrow at the round bone, but well covered with flesh in the twist, and the flank full and large. The legs ought to be straight below the knee and hock, and of a moderate length; light boned; clean from fleshiness, yet having joints and sinews of a moderate size, for the united purposes of strength and activity. In these points all intelligent breeders concur; but, as beauty of shape too often depends on the caprice of fashion, it is more requisite to regard,

II. *Utility of form*, or that nice proportion of the parts which has already been noticed.

III. The flesh, or texture of the muscular parts: a quality which was formerly noticed only by butchers, but the knowledge of which is justly deemed essential by the enlightened breeders of the present day; and although this quality necessarily varies according to the age and size of cattle, yet it may be greatly regulated by attention to the food employed for fattening them. As a knowledge of this requisite can only be acquired by practice, it is sufficient to state, that the best sign of good flesh is that of being *marbled*, or having the fat and lean finely veined, or intermixed when the animals are killed; and, while alive, by a firm and mellow feel.

IV. In *rearing live stock* of any description, it should be an invariable rule to breed from small boned, straight back, healthy, clean, kindly skinned,* round bodied, and barrel shaped animals, with clean necks and throats, and little or no dewlap; carefully rejecting all those which may have heavy legs and *roach* backs, together with much appearance of offal. And, as some breeds have a tendency to generate great quantities of fat on certain parts of the body, while in others it is more mixed with the flesh of every part of the animal, this circumstance will claim the attention of the breeder as he advances in business.

V. In the *purchasing of cattle*, whether in a lean or fat state, the farmer should on no account buy beasts *out of richer or better grounds* than those into which he intends to turn them: for, in this case, he must inevitably sustain a very material loss, by the cattle not thriving, particularly if they be old. It will, therefore, be advisable to select them, either from stock feeding in the neighborhood, or from such breeds as are best adapted to the nature and situation of the soil.

VI. *Docility of disposition*, without being deficient in spirit, is of equal moment; for, independent of the damage committed by cattle of wild tempers on fences, fields, &c., which inconvenience will thus be obviated, it is an indisputable fact, that *tame beasts require less food to rear, support, and fatten them;* consequently, every attention ought to be paid early to accustom them to be docile and familiar.

VII. *Hardiness of constitution*, particularly in bleak and exposed districts, is indeed a most important requisite; and in every case it is highly essential to a farmer's interest to have a breed that is liable neither to disease nor to any hereditary distemper. A dark color, and in cattle

* As this word may probably often appear in the course of the subsequent pages, it may not be altogether irrelevant to state, that it implies a skin which feels *mellow*, i. e. soft, yet firm to the touch, and which is equally distant from the hard, dry skin, peculiar to some cattle, as it is from the loose and flabby feel of others.

which are kept out all the winter, a rough and curled *pile* or coat of hair are, in the popular estimation, certain indications of hardiness; but it must be obvious to every thinking person, that this quality, though in some respects inherent in particular breeds, depends, in a great measure, upon the method in which cattle are treated.

There is, indeed, a rather prevalent opinion, that white is a mark of degeneracy, and that animals of the most vivid hues possess the greatest portion of health and strength; in proof of which it has been instanced that among mankind, a healthy habit is visible in the floridness of the complexion; as sickness is perceptible in the paleness of the looks, and the decrepitude of age in the whiteness of the hair. It has also been remarked that grey horses are commonly of a tender constitution, until crossed with darker breeds; and that among the feathered tribe, the common poultry, with high colored plumage, are in all respects superior to the white. But it has been justly observed, in reply, that the powerful polar bears, and many of the strongest birds, as the goose and swan, are white; nor will it escape observation, as more immediately touching the present subject, that the wild cattle are invariably of that color; and that the highest bred Herefords are distinguished by white faces.*

VIII. Connected with hardiness of constitution is *early maturity*, which, however, can only be attained by feeding cattle in such a manner as to keep them constantly in a growing state. By an observance of this principle, it has been found that beasts and sheep, thus managed, *thrive more in three years*, than they usually do in *five* when they have not sufficient food during the winter, by which in the common mode of rearing, their growth is checked.

IX. A *kindly disposition* to take fat on the most valuable parts of the carcass, at an early age, and with little food, when compared with the quantity and quality consumed by similar animals. On this account smaller cattle have been recommended as generally having a more natural disposition to fatten, and as requiring, proportionably to the larger animal, less food to make them fat; consequently, the greater quantity of meat for consumption can be made per acre. "In stall feeding"—the nature, method, and advantages of which will be stated in a subsequent chapter,—it has been remarked, that "whatever may be the food, the smaller animal pays most for that food; in dry lands, the smaller animal is always sufficiently heavy for treading; in wet lands less injurious." But this opinion is combatted by many able judges, who still contend that the largest animals are the most profitable. They doubtless are so on good keep; but the smaller animals will thrive on soils where heavy beasts will decline.

* It is stated in the Agricultural survey of Leicestershire, England, as the remark of a scientific observer of the cattle usually bred in that county, "that those of a deep red, dark liver color, or black, with tanned sides, are the hardiest, and have the best constitutions; will endure the severest weather, perform the most work, live to the greatest age, and fatten on such food as would starve those of weaker colors." But in opposition to this, we have, in the Annals of Agriculture, the assurance of Mr. Campbell, a practical and extensive breeder, that upon repeated comparative trials, "he has had bulls, oxen, and cows, of a white breed, as healthy and hardy as any others."

X. *Working*, or an aptitude for labor; a point of infinite importance in a country whose population is so extensive as that of Britain, and where the consumption of grain by horses has so material an influence on the comforts and existence of the inhabitants. As, however, there is a difference of opinion on this subject, the reader is referred to the chapter where the question is fully discussed. But, whether kine be purchased for the plough, or for the purpose of fattening, it will be necessary to see in addition to the essentials already stated, that they are young, in perfect health, full-mouthed, and not broken either in tail, hair, or pizzle; that the hair *stare* not, and that they are not hidebound, otherwise they will not feed kindly. The same remark is applicable to cows intended for the pail, the horns of which should be fair and smooth, the forehead broad and smooth, udders white, yet not fleshy, but thin and loose when empty, to hold the greater quantity of milk, but large when full; provided with large dug-veins to fill it, and with four elastic teats, in order that the milk may be more easily drawn off.

XI. Besides the rules above stated, there are some particulars with regard to the *age* of neat or black cattle and sheep, which merit the farmer's consideration.

"Neat cattle cast no teeth until turned two years old, when they get two new teeth; at three they get two more; and in every succeeding year get two, until five years old, when they are called *full-mouthed*, though they are not properly full-mouthed, until six years old, because the two corner teeth, which are last in renewing, are not perfectly up until they are six."*

The horns of neat cattle also supply another criterion by which the judgment may be assisted, after the signs afforded by the teeth become uncertain. When three years old, their horns are smooth and handsome; after which period there appears a circle, or wrinkle, which is annually increased as long as the horn remains; so that, according to the number of these circles or rings, the age of a beast may be ascertained with tolerable precision, unless such wrinkles are defaced, or artificially removed, by scraping or filing; a fraudulent practice, which is but too frequently adopted, in order to deceive the ignorant or inexperienced purchaser with respect to the real age of the animal. There is also a tip at the extremity of the horn, which falls off about the third year.

## OF THE BULL.

A bull ought to be the most handsome of his kind; he should be tall, and well made; his head should be rather long, but not coarse, as fineness of head indicates disposition to fatten; and as it is designed by nature to be the chief instrument both of offence and defence, it ought to present every mark of strength; his horns clean and bright; his large black eyes lively and protuberant; his forehead broad and close set with short, curled hair; his ears long and thin, hairy within and without; muzzle fine, nostrils wide and open; neck strong and muscular, not encumbered with a coarse wreathy skin, but firm, rising with a gentle curve from the shoulders, tapering to the part where it is connected with the head; dewlap thin, and but little loose skin on any part.

* Cully on Live Stock, pp. 208, 209.

OF THE BULL.

Further, his shoulders should be deep, high, and moderately broad at the top; the bosom open; breast large and projecting well before his legs; back straight and broad, even to the setting on of the tail, which should not extend far up the roof, but be strong and deep with much lank hair on the under part of it; ribs broad and circular, rising one above another, so that the last rib shall be rather the highest; the fore thighs strong and muscular, tapering gradually to the knees; the belly deep, straight, and also tapering a little to the hind thighs, which should be large and square; the roof wide, particularly over the chine and *hips* or *hooks*; the legs straight, short-jointed, full of sinews, clean and fine boned: knees round, big, and straight; feet distant one from another, not broad, nor turning in, but easily spreading; hoofs long and hollow; the hide not hard or stubborn to the touch; the hair uniformly thick, short curled, and of a soft texture; and the body long, deep, and round, filling well up to the shoulder, and into the groin, so as to form what has not improperly been termed a round, or *barrel-like* carcass.

The bull attains the age of puberty generally at the end of from twelve months to two years; but it has been thought advisable to restrain him from the propagation of his species until he has arrived at his full growth, which is about four years; for if this animal is suffered to breed, earlier than three years, the stock is liable to degenerate. It must however be admitted, that a contrary opinion prevails among many eminent breeders, who maintain that the bull is in his full vigor at eighteen months old, at which age his progeny will display the most strength.

The bull, as well as the cow and ox, generally lives about fourteen years; but the progress of decay is usually perceptible after he has attained the age of ten years.

For the prevention of accidents from mischievous bulls, an ingenious and simple contrivance has been suggested by Henry James Nicholls, Esq., of Woodhall, near Wisbeach, on whom the Society for the Encouragement of Arts, Agriculture, &c. in 1815, conferred a premium of ten guineas for his invention. Of its form and application, the following engravings will convey a correct idea.

Fig. 1.

Fig. 1, Represents a front view of the apparatus, as affixed to the head of the animal. It consists of a straight piece of wood or iron, (the latter is the preferable material,) stretching from horn to horn, perforated at each end so as to pass over the tips, and fastened on them by the usual metal nuts. On the centre of this is riveted *a curved bar of iron*, bending upwards, which moves easily on the rivet, and has holes at each end, containing the upper round link of a chain. These chains again unite in a strong iron ring, which opens by a hinge and screw, and passes through the bull's nose. The effect of this contrivance is as follows:—any person seeing a vicious animal approach may easily avoid him; but if the beast should make a push forward, the curved iron bar will prevent any bad consequences; and if he move in the smallest degree to the right or to the left, the bar communicating by the chain with the ring upon his nose will bring him immediately to check.

Fig. 2.

This *lateral* operation is delineated in Fig. 2. An additional advantage resulting from the use of this invention is, that a beast may, with the smallest power, be led in any direction.

COW. A perfect breeding cow ought to have a fine head, with a broad, smooth forehead; black eyes; clean horns; a smooth, elastic skin; a large deep body; strong muscular thighs; a large white udder, with long and tapering teats; together with every other token requisite in a bull, allowing for the difference in sex. Further, such animals ought particularly to be young. Milch kine are not good for breeding after they are twelve years old: indeed, it is said the first calf which a cow brings is the best for raising.

*The criteria of a beautiful cow*, according to Wilkinson, m[illegible] thus expressed:

> " She's long in her face, she's fine in her horn,
> She'll quickly get fat without cake or corn,
> She's clear in her jaws, and full in her chine,
> She's heavy in flank, and wide in her loin.

## OF THE COW.

"She's broad in her ribs and long in her rump,
A straight and flat back with never a hump,
She's wide in her hips, and calm in her eyes,
She's fine in her shoulders, and thin in her thighs—

"She's light in her neck, and small in her tail,
She's wide in her breast and good at the pail;
She's fine in her bone, and silky of skin,
She's a Grazier's without, and a Butcher's within."

*Culley's marks of a good cow are these:* wide horns, a thin head and neck, dewlap large, full breast, broad back, large and deep belly; the udder capacious, but not too fleshy: the milky veins prominent, and the bag tending far behind; teats long and large; buttocks broad and fleshy; tail long and pliable; legs proportionable to the size of the carcass; and the joints shut. To these outward marks may be added a gentle disposition, a temper free from any vicious tricks, and perfectly manageable on every occasion. On the other hand, a cow with a thick head, and a short neck, prominent back bone, slender cheek, belly tucked up, small udder, or a fleshy bag, short teats, and thin buttocks, is to be avoided as totally unfit for the purposes, either of the dairyman, the suckler, or the grazier.

Cows are purchased either with a view of being fattened for sale, for breeding, or for the purposes of the dairy. In the first case, attention must be paid to the kindliness of the skin, and disposition to fatten. With regard to those which are intended for breeding, care should be taken to select the best of that particular stock intended to be raised; and for the dairy, those which yield the most and the richest milk.

The cow is supposed, by some eminent naturalists, to arrive at puberty at the end of eighteen months, though instances have occurred where these animals have produced calves before that time. It is, indeed, said by some breeders in the northern part of England, that young cows may be sent to bull as early, even, as *one year* old; but there is then much danger in calving; and although the practice would certainly be an essential improvement, where the dairy constitutes a primary object, provided their growth would not thus become stinted, it is yet generally considered as injurious. It is, therefore, advisable not to permit cows to take the bull earlier than two years, though many breeders defer it another year; and in conformity to the latter opinion, the late eminent Mr. Bakewell deferred sending his cows to bull till they were three years old; but they often missed calf, which accident Sir John Sinclair attributes to this circumstance; but the most proper period must in some measure depend on the breed, on the time at which the heifer was herself dropped, and on her condition; as some which have been well kept, will be more forward at two, than others, which have been stinted, at three years of age. In case, however, a cow produces a calf before she enters upon her third year, the animal should be removed from her; and it will be proper to milk her for the three following days, to preserve the udder from becoming sore, but afterwards to forbear milking.

The period of time during which cows are allowed to *run dry*, previously to calving, is by no means settled. By some graziers, they are

recommended to be laid dry, when they are five or six months gone with calf; but repeated and successful experiments prove that six weeks, or two months are sufficient for this purpose. Indeed, cows kept in good condition, are sometimes drawn until within a fortnight of calving. Gov. Lincoln, of Massachusetts, says of a heifer of the Denton blood—"a heifer of three years, with her second calf, has not been dry since she dropped her first, having given four quarts on the morning of her second calving." This practice, however, is not to be recommended, for if the cow *springs*, before she is dry, serious injury, it is said, may ensue. Some cows, it is well known, are in the habit of drying up *quite unseasonably*. To prevent this, such cows should be milked by a skilful hand, expeditious, and entirely clean; and even then it is doubtful whether the evil admits of an entire remedy, if a habit of drying up early have been formed. To *prevent* the evil in respect to a cow, a writer in the New England Farmer, (Vol. VII. p. 162,) recommends, to begin *young*. "I have found," says he, "that young cows, the first year they give milk, may be made, with careful milking and good keeping, to give milk almost any length of time required, say from the first of May to the first of February following; and will give milk late always after, with careful milking. But, if they are left to dry up of their milk early in the fall, they will be sure to dry up their milk each succeeding year, if they have a calf near the same season of the year; and nothing but extraordinary keeping will prevent it, and that but for a short time."

No animal on the farmer's premises pays better for good keeping than the cow. They need to be kept in *good condition the whole time*, for if they are suffered to become very lean, and that in the winter season, it is impossible that they should be brought to afford a large quantity of milk, until they have had the advantage of the following summer. When cows are lean at the period of calving, no management is ever capable of bringing them to afford for that season any thing near the proportion of milk they would have done, had they been in proper condition.

If in any one point the New England farmer seems to fail more than in another, it is in not feeding cows sufficiently *early in the fall*. They are left to pick a scanty and frost bitten food, on the coming on of the chilly and rainy season; and it is not uncommon to find cows, which at an early period of the fall were in good condition, poor and ill-conditioned by the setting in of winter. The *solids* of the beast are dissipated; her milk reduced, and her value to the owner greatly diminished. These remarks, it may be observed, will apply with nearly equal truth to the whole stock of many of the farmers in New England.

Many excellent heifers for milk are nearly ruined by bad milkers. If they are *ticklish*, as the farmers express it, they should be treated with great gentleness. If the udder be hard and painful, as it sometimes is, let it be tenderly fomented with lukewarm water, and gently rubbed, in order to bring the creature into good temper.

It will, however, sometimes happen, if a cow, (especially a young one) is managed with ever so much care, she will kick, and exhibit other symptoms of a vicious disposition. In such cases, the editor of the New England Farmer recommends the following mode of managing a cow, suggested by one of his correspondents. (See New England Farmer, vol. III. p. 10).

"I have seen," observes the above correspondent, "very promising heifers spoiled, when first beginning to milk them, by banging and hallooing at them because of their kicking. I have also seen cows give a good mess of milk, and when they had done, kick it over. I can always tell when a heifer is inclined to kick, before her calf is gone. If she is, I take a strong strap, buckle it tight round her hind legs, below the gambril joints, including her tail if it is long enough. This method will cause much uneasiness at first. If the cow falls down, no matter for that, let her lie a minute or two. Then unbuckle the strap, let her get up, and then fit it on again. Perhaps she may throw herself down again, but she will be very careful how she throws herself down the third time. After she stands still put the calf to her, and let her stand in this manner till the calf has done sucking. Let this be done a few times, and it will generally break the cow of kicking, also of starting and running when part milked, as some cows will. I put on the strap before the calf is gone, because if let alone till afterwards, the cow is apt to hold up her milk when the strap is first put on.

"If the teats of a cow are sore, they should be washed with sugar of lead and water. The proportion recommended, is two drachms of sugar of lead to a quart of water. If tumors appear, a warm mash of bran, with a little lard, is said to be a good application. The following liniment is said to be efficacious:—Linseed oil 4½ oz., Liquor of Ammonia, ½ oz."

Another method (See New England Farmer, Vol. II. p. 132) is, after tying the cow in the stanchels, to make one end of a rope fast round her horns, and put the other end over the girt which is about two feet higher than the top of the stanchels, and about the same distance in front, draw it pretty tight and fasten it to a stud. This so effectually secures her that she may be milked with the most perfect ease and safety; and after practising this method two or three times, she will give no more trouble.

It is said that several trials on different cows have proved this method not only vastly superior to all others, but an effectual remedy; and it is so easy and simple, that a female or boy can secure a cow without any difficulty. Another advantage this method has over any other, is, that by keeping the cow's back hollow, it is believed, she cannot hold up her milk.

It is desirable sometimes to *dry* cows more expeditiously than can be well done in the common way; especially when they have a plenty of fresh food. The following method is recommended in Monk's Agricultural Dictionary. Take an ounce of powdered alum; boil it in two quarts of milk until it turns to whey: then take a large handful of sage, and boil it in the whey, till you reduce it to one quart; rub her udder with a little of it, and give her the rest by way of drink; milk her clean before you give it to her; and as you see need, repeat it. Draw a little milk from her every second or third day, lest her udder be overcharged.

The *period of gestation*, or time during which the cow goes with calf, is various; with a bull calf, she usually goes about forty-one weeks, with a difference of a few days either way; a cow calf comes in less time. Between nine and ten months, therefore, may be assigned for the period of gestation; at the end of which time she produces one calf; though

instances sometimes occur when two, or even three, are brought forth. It may not, however, be useless to remark, that some cows are naturally barren, which is said to be the case when a male and female calf are produced at the same time. The male animal is perfect in all respects; but the female, which is denominated a *free martin*, is incapable of propagating her species; it does not vary very materially in point of form or size from other neat cattle, though its flesh is erroneously supposed to be greatly superior with regard to flavor and fineness of the grain.

Some very interesting experiments respecting the periods of gestation in different animals, were made a few years ago, by M. Teiesier, of the Society for the encouragement of Arts, at Paris, from which it appears that out of 577 cows,

| | | | |
|---|---|---|---|
| 21 calved between the | 240th and | 270th day; | mean term 259½ |
| 544 | 270th | 299th | 282 |
| 10 | 299th | 321st | 303 |

Thus, between the shortest and longest gestation there was a difference of eighty-one days, which is more than one fourth of the mean duration.

### ON THE TREATMENT AND REARING OF CALVES.

The importance of forwarding calves to maturity, with the greatest possible advantage, to the full developement of their natural qualities, has called forth the ingenuity of the most careful observers, and best breeders. The most approved plan, and certainly, the best general plan, is to adhere, as closely as possible, to nature.

On the birth of the calf, the cow generally shows an inclination to clean its skin by licking it. To facilitate this object, it is a frequent practice to throw a handful of common salt over the calf, or to rub a little brandy on it.

Some practise taking the calf from the dam immediately, and in an hour after birth, to give it a pint of luke-warm gruel, in lieu of the *beestings*, or first milk of the cow. This practice appears, however, objectionable, since it is obvious, that nature has provided the beestings as the proper aliment of the newly born animal.

The mode of rearing calves, both in England and in the United States, is various. The usual method in Yorkshire, and most parts of Scotland, says Loudon, is that of giving them milk to drink, there being few instances where they are allowed to suck. For the first two or three weeks, they mostly get milk warm from the cow; but for the next two or three weeks, half the new milk is withdrawn, and skimmed milk is substituted in its stead; and at the end of that period, the new milk is wholly withdrawn; they are then fed on skimmed milk alone, or sometimes mixed with water, till they are able to support themselves by eating grass, or other food of that sort.

In Cheshire, the practice is to allow the calves to suck, for the first three weeks. They are then fed on warm new whey, or scalded whey, and buttermilk, mixed; with the green whey, water is frequently mixed, and either oat meal or wheat and bean flour added. A quart of meal or flour is thought sufficient to mix with forty or fifty quarts of liquid. Oat meal gruel, and buttermilk, with an addition of skimmed milk, are

also used for the same purpose. Some one of these prepared kinds of food is given night and morning, for a few weeks after the calves are put on that diet, but afterwards only once a day, till they are three months old or more.

The calves in Gloucestershire are not allowed to suck above two or three days; and are then fed on skimmed milk, which is previously heated over the fire. When they arrive at such an age as to be able to eat a little, they are allowed split beans, or oats; and cut hay, and water; all mixed with the milk.

In Sussex, it is common to allow the calves to suck for ten or twelve weeks, or to wean them at the end of three or four, and give them a liberal allowance of skimmed milk, for six or eight weeks longer.

In Middlesex, the methods pursued for rearing calves, are either by giving them a pail-full, containing about a gallon, warm from the teat of the cow, morning and evening, for eight or ten weeks, or which is certainly the most agreeable to nature, and therefore to be preferred to any other that can be adopted, to allow the calf to suck its dam, as is sometimes done in the county of Sussex, and generally in Wigtonshire.

According to Marshall, the best method is this; the calves suck a week or fortnight *according to their strength*, (a good rule;) new milk in the pail, a few meals; next, new milk and skim-milk mixed, a few meals more; then skim-milk alone, or porridge made with milk, water, ground oats, &c., and sometimes oil-cake, until cheese making commences; after which, whey, porridge, or sweet whey, in the field; being careful to house them in the night, until warm weather be confirmed. This method of sucking is not, however, free from objection; and in the ordinary practice of rearing calves, it is held to be a preferable plan, to begin at once to learn them to drink from a pail. The calf that is fed from the teat must depend upon the milk of its dam, however scanty or irregular it may be; whereas, when fed from a dish, the quantity can be regulated according to its age, and various substitutes may be resorted to, by which a great part of the milk is saved for other purposes, or a greater number of calves reared on the same quantity. Yet it would seem to be a good practice to allow calves to suck for a few days at first, if there was no inconvenience to be apprehended both to themselves and their dams, from their separation afterwards.

When fed from the pail, the average allowance to a calf is about two English wine gallons of milk daily for twelve or thirteen weeks; at first, fresh milk as it is drawn from the cow, and afterwards skim-milk. But after it is three or four weeks old, a great variety of substitutes for milk are used in different places, of which linseed oil-cake, meal, and turnips, are the most common.

When calves are reared with skim-milk, it should be boiled and suffered to stand until it cools to the temperature of that first given by the cow, or a trifling degree more warm, and in that state given to the calf. Milk is frequently given to calves warm only; but that method will not succeed as well as boiling it. If the milk be given over cold, it will cause the calf to skit or purge. When this is the case, put two or three spoonfuls of rennet in the milk, and it will soon stop the looseness. If, on the contrary, the calf is bound, bacon broth is a very good and safe thing to put into the milk. One gallon of milk per day will keep a calf well, till

it be thirteen weeks old. A calf may then be supported without milk, by giving it hay and a little wheat bran once a day, with about a pint of oats. The oats will be found of great service as soon as the calf is capable of eating them. The bran and oats should be given about mid day; the milk in portions, at eight o'clock in the morning, and four in the afternoon. But whatever hours are chosen to set apart for feeding the calf, it is best to adhere to the particular times, as regularity is of more consequence than many people think. If the calf goes but an hour or two beyond his usual time of feeding, he will find himself uneasy, and pine for food. It is always to be understood that calves reared in this manner, are to be enticed to eat hay as early as possible; and the best way of doing this is to give them the sweetest hay that can be got, and but little at a time. Turnips or potatos are very good food, as soon as they can eat them, and they are best cut small, and mixed with the hay, oats, bran, and such articles. It may be observed, that it is not absolutely necessary to give milk to calves after they are one month old; and to wean them gradually, two quarts of milk with the addition of linseed boiled in water, to make a gruel, and given together, will answer the purpose, until by diminishing the milk gradually, the calf will soon do entirely without. Hay tea will answer the purpose, with the like addition of two quarts of milk; but is not so nutritious as linseed. It is a good method of making this, to put such a proportion of hay as will be necessary, into a tub, then pour on a sufficient quantity of boiling water, covering up the vessel, and letting the water remain long enough to extract the virtues of the hay. When bacon or pork is boiled, it is a good way to preserve the liquor or broth, and mix it with the milk for the calves.

Another mode of rearing calves, said to have been suggested by the Duke of Northumberland, is to take one gallon of skim-milk, and to about a pint of it, add half an ounce of common treacle, stirring it until it is well mixed, then to take an ounce of linseed oil cake, finely pulverized, and with the hand let it fall gradually, in very small quantities, into the milk, stirring it in the mean time, with a spoon or ladle, until it be thoroughly incorporated: then let the mixture be put into the other part of the milk, and the whole be made nearly as warm as new milk, when it is first taken from the cow, and in that state it is fit for use.

The quantity of oil cake powder may from time to time be increased, as occasion may require, and as the calf becomes inured to the flavor of it. Crook's method, is to make a jelly of one quart of linseed, boiled ten minutes in six quarts of water, which jelly is afterwards mixed with a small quantity of the best hay tea; on this he rears many calves, without milk.

On this important subject, many individuals of careful observation, and great practical skill, in the United States, have written copiously. Our limits will permit us to notice the methods recommended by only a few.

The following is the method of Mr. William Budd, which obtained the gold medal of the Agricultural Society of Massachusetts:

"Take the calves when three days old, from the cows, and put them into a stable by themselves; feed them with gruel, composed of one third barley, two thirds oats, ground together very fine, sifting the mix-

ture. Each calf is to receive a quart of gruel morning and evening, and to be made in the following manner; to one quart of the flour, add twelve of water, boil the mixture half an hour, let it stand until milk-warm. In ten days, tie up a bundle of soft hay in the middle of the stable, which they will eat by degrees. A little of the flour put into a small trough for them occasionally to lick, is of service. Feed them thus till they are two months old, increasing the quantity. Three bushels of the above mixture will raise six calves."

Mr. Clift, of the New York Agricultural Society, takes the calf from the cow at two or three days old; he then milks the cow, and while the milk is warm, teaches the animal to drink, by holding his head down into the pail; if the calf will not drink, he puts his hand into the milk, and a finger into the mouth, till the beast learns to drink without the finger.* After he has been fed with new milk for a fortnight, the cream is taken off the milk, with which an equal or larger portion of thin flax seed jelly is mixed, and the whole is given milk warm. Thus, as the spring is the most favorable season for making butter, he is enabled, during the six or seven weeks the animals are kept previously to weaning, to make as much butter as they are worth: a practice which merits the attention of our farmers, to whom it will afford a very essential saving.

The next method which we notice, is that practised by the religious society denominated Shakers, at Canterbury, N. H., and which appears to be highly judicious.

"We let calves that come in the fore part of March, suck about a week or ten days, then take them from the cow, giving them a moderate allowance of new milk to drink, till they have learnt to drink it freely; then put in some skimmed milk; and we feed them wholly on skimmed milk, taking care to give it at about the temperature of milk directly taken from the cow, by heating a part of it, and mixing it with the rest. Care should be taken not to scald the milk when heated: also not to give them any sour milk, for this will make them scour. The trough or vessel in which they drink this milk, should be kept clean, and not suffered to get sour.

"We let the milk stand about twelve hours before it is skimmed; giving a calf at first about four quarts night and morning; increasing the mess as need requires, till he is six weeks old, from which time till ten weeks old, he will require perhaps about twelve quarts per day.

"When about ten weeks old, we begin to diminish the quantity of milk for about the space of two or three weeks, at which time we wean them. During the whole process, from two to fourteen weeks old, calves should be well supplied with good hay, salt and provender; such as oats, wheat bran, and oil cake ground fine; they should also be sup-

* It is sometimes found difficult to teach a calf to drink, or even to suck the milk by means of the fingers. This generally arises from ignorance as to the proper manner of using the fingers. These—the first and second fingers of the right hand will be sufficient—should be so pressed upon the calf's tongue as to form a curve of the tongue, in which case the calf will invariably draw; at least the editor has never experienced any difficulty since he has practised in the above way.

plied with scurf or dirt, (though scurf is the best,) which is a preventive against scouring.

"The particular advantages to be derived from the above method of treatment are the following:

"1. It is much cheaper than to let them suck in the ordinary way; whereas it makes a great saving of cream for butter, and that without injuring the calves, if they are properly attended to.

"2. It prevents calves from moaning or pining so much while weaning, as they would otherwise do, when taken from the cows.

"3. It not only prevents the cows being injured in consequence of the calves biting the teats; but also prevents their holding back their milk from the milker, which often serves to diminish the milk afterwards. The only disadvantage to be found in the above method of treatment is, that it requires some more labor to feed them, where they thrive equally well in every respect, as those do who are permitted to suck in the ordinary way."

A writer in the American Farmer, Vol. V., p. 172, observes, that the most proper way of rearing calves, is to wean them at about eight days old, to keep them constantly in the stable, and teach them to drink out of a bucket, which is easily accomplished by putting new milk into a basin, and letting them suck your fingers with the hand immersed in the milk, and in a few days withdrawing the fingers gradually from the mouth, afterwards giving as much new milk as they can drink for five or six weeks, when they will begin to eat a little grass or clover, which can be pulled and given in small quantities twice a day, and when they eat freely, you may mix a little water with the milk; or at eight or ten weeks old, give sweet skimmed milk, slightly warmed, which soon after dilute with water, and add a little meal; should milk be wanted for other purposes, give flax seed tea, which commence by mixing with milk slightly warmed; indeed, by keeping calves constantly in the house, you may induce them to eat almost any kind of nutritious food: they also become perfectly docile, have fine round bodies, with clean, smooth hair, and a sprightly look; but if turned out into the field, they are tormented by flies and heat, never in good condition the first year, but remarkable for pot bellies, rough hair, heavy look, and ugly flat sides; indeed the contrast in appearance is so great, that I think laziness alone would induce any one to turn their calves into a field the first summer. If change of food produces either costiveness or looseness, give about half a pint of spermaceti oil, to be repeated if found necessary; it will prove a cure, and can easily be given out of a black bottle; it is also good for cows that are drooping or unwell, adding of course to the above quantity.

Calves intended for the butcher, the same writer adds, ought always to be tied up in a stable, and if kept in darkness, so much the better, as they will be less disturbed by flies, and will sleep more, than if constantly in the light; the mother ought to be turned in twice or thrice a day, and the calf permitted to suck as much as it wants, never taking any milk from the mother until it is satisfied. If every farmer would thus manage, we should see less poor veal than is now exhibited in our market.

In noticing the above methods of treating and managing calves, mention has been made of *flax seed jelly* and *clover tea.* To make the for-

mer, S. W. Pomeroy of Massachusetts, recommends "to take one part of flax seed and five or six parts of water; let it soak from 12 to 48 hours, according to the temperature of the weather; then boil for a quarter of an hour, stirring it to prevent burning—keep it in a cool place, and not more than will suffice for a week should be made at a time in warm weather.

For clover tea, cut the best cured clover hay, about as fine as common straw chaff, press it into a kettle and fill it with water—cover and boil half an hour—if soaked six or twelve hours, less boiling will answer. Express as much of the juice as possible, and the residuum will be eaten greedily by store swine, if mixed with their swill. Unless the clover was cured with salt, (a method I always practise) some should be put into the kettle, which may sometimes require to be filled up with water.

In the rearing of calves, much, certainly, depends on regularity in feeding them. The common practice is, to supply them with food twice in the day, in the morning and at evening, when they generally receive as large a quantity as their craving appetites can take. Hence the digestive organs are necessarily impaired, and disease is perhaps engendered. These evils may be avoided by feeding thrice in a day, at equidistant intervals, and allowing sufficient room for exercise, when the calves are not intended to be fattened.

### OF STEERS AND DRAUGHT OXEN.

A good ox for the plough should be neither too fat nor too lean, as in the former case he will be too lazy, and in the latter he will be too weak and unfit for labor. His body ought to be full, joints short, legs small, eyes full, his coat smooth and fine, (which latter circumstance is a certain indication of good health,) and every part symmetrical, or well put together so that his strength may be easily seen.

Those calves which are designed for draught, may be easily accustomed to the yoke, with proper care. At even an early age, a light yoke may be frequently put upon them; in which they may be suffered to stand, or wander in the field, for an hour or two each day. But it is doubted, whether, in any case, they should be put to hauling burdens, even the lightest, lest they should be strained. Some of the most docile and useful oxen we have ever seen, were trained in this way.

Calves thus managed, may doubtless be put to labor at an earlier period than others. Much labor should not be required of steers, until they are three years of age; and even at this period, if over worked, they seldom recover from it. Oxen whose work is so proportioned to their strength and keeping, as not to affect their growth, will continue to increase in size till about their seventh year. Many oxen, however, cease growing sometime before they have attained to this age; but it is generally owing to poor keeping and being over worked.

It is often objected to oxen, that they are too slow for profit. For some kinds of work they doubtless are so. But the slow pace at which oxen move generally is entirely unnecessary. With a proper load they might doubtless be made to travel with double their usual expedition, and with equal ease to themselves.

It is also desirable that oxen should be accustomed to work equally well on either side. To this they may be easily trained, especially when young.

The strength of an ox, when properly trained and managed, is very great; and he has patience to endure fatigue. The only method by which success can be attained, says the Complete Grazier, is, by patience, mildness, and even by caresses; for compulsion and ill treatment will irritate and disgust him. Hence, great assistance will be derived from gently stroking the animal along the back, by patting him, and encouraging him with the voice, and occasionally feeding him with such aliments as are most grateful to his palate. It will also be proper to tie his horns frequently, and after a few days to put a yoke upon his neck, when he should be fastened to a plough with a tame old ox, of equal size; next, the oxen should be employed in some light work, which they may be suffered to perform easily and slowly; thus they will draw equally, and the young steer will be gradually inured to work. After working in this manner, he should be yoked with an ox of greater spirit and agility, in order that the steer may learn to quicken his pace; and by thus frequently changing his companions, as occasion may allow, he will, in the course of the first month or six weeks of his labor, be capable of drawing with the briskest of the stock.

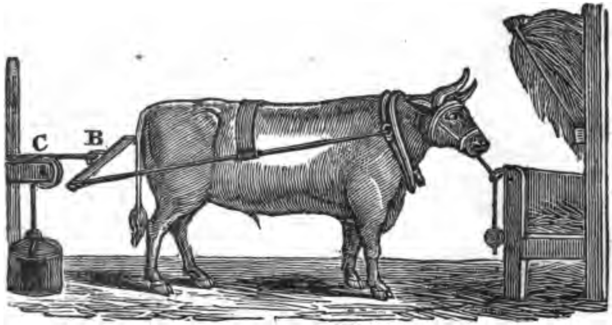
After a steer is thus properly broken, it will be advisable, for the future, to match such as are intended to draw in the same team, or yoke; attention being paid to their size, strength, and spirit or temper; otherwise, by being unequally matched, they will not only spoil their work, and be greatly disqualified for draught, but the slower or weaker animal of the two, being urged beyond its natural powers, will inevitably receive material injury.

Another circumstance of essential importance in breaking-in young oxen is, that when first put to work, whether at the plough, or in teams for draught, they be not fatigued or over-heated. Till they are thoroughly trained, therefore, it will be necessary to employ them in labor only at short intervals; to indulge them with rest during the noon-day heats of summer, to feed them with good hay, which in this case is preferable to grass. In fact, while oxen are worked, they must be kept in good condition and spirits, by moderate, but wholesome sustenance. Farther, on their return home from labor, it will greatly contribute to preserve their health, if their feet be well washed previously to leading them into their stalls; otherwise, diseases might be generated by the filth adhering to them; while their hoofs becoming soft and tender, would necessarily disable them from working on hard or stony soils. The extremes of heat and cold ought also to be carefully guarded against, as disorders not unfrequently arise from excess of either temperature; and they are peculiarly exposed to fevers and the flux, if chased or hurried, especially in the hot weather.

Steers are sometimes refractory. In such cases, it will be advisable to keep them till they are hungry; and when they have fasted long enough, they should be made to feed out of the hand. On returning to labor, they should be tied with a rope; and if at any time they become refractory, the gentle measures above described, should be adopted, in order to bring them to work readily and quietly.

## METHOD OF ACCUSTOMING ANIMALS TO DRAW.

The following easy method of accustoming animals to draw, is given by the Editor of the American Farmer, from the French. (See American Farmer, Vol. VII. p. 76.)




AN EASY METHOD OF ACCUSTOMING ANIMALS TO DRAW.

The readiest way to make animals submit to the yoke or harness, is to habituate them gradually to the draft, in the very act of satisfying the cravings of hunger. For this purpose attach them to the manger, by means of a cord which runs through a ring—and at the extremity of which a weight is attached, as represented in the above figure, so that the animal may at pleasure approach or recede from the manger. A collar is put on the animal, with two cords fixed to a bar or swingle-tree, to which another cord is attached at B, which passes through the pulley at C, and to which is suspended a weight to be increased at pleasure—things being thus arranged, forage is put in the rack. The animal when pressed by hunger approaches his food; in doing which, he raises the weight, and keeps it suspended as long as he continues to eat—and thus contracts the habit of drawing in a few days. He is free to relax his exertions, for whenever he recedes, the weight reposes on the ground.

In working oxen to advantage, much depends on the mode of harnessing them, and upon what has been termed the principle of draught. This principle depends upon the joint power of the neck and base of the horn. In Portugal, these animals are harnessed in the following manner: a long leather strap is wrapped round the yoke whence it passes round the lower part of the horns, and is again fastened to the yoke. By this contrivance, the heads of the oxen become more steady, while performing their work, and these useful animals are rendered more tractable.

In France, and on the Peninsula, oxen are worked by *the head*, and are yoked in a manner which is better expressed by the aid of figures, than by description.

Figure 1, represents a view of the hinder part of the head and neck of these animals in the yoke, as they appear to a spectator; and figure 2 exhibits a front view of the upper parts of the heads, in order to con-

REPRESENTATION OF YOKING OXEN IN FRANCE.

REPRESENTATION OF YOKING OXEN IN FRANCE.

vey a more accurate idea of the mode in which the French oxen are fastened to the bow.

The question "whether it is most advantageous to yoke oxen by the head or by the collar," has occasioned much discussion, and is even yet undetermined. The prejudice throughout Great Britain is, generally speaking, decidedly in favor of the collar; but throughout Spain and Portugal, where oxen are the only animals employed in agricultural labor, whether of road or field draught, they are invariably yoked by the head. The strength of the animal indeed lies in his neck; of the power of which, the yoke affords him all the advantage; while the collar deprives him of it, as he does not draw by the shoulders. The far greater cost and trouble of harness than of yokes and bows are also considerations of moment; and in summer, harness has been found an incumbrance, the ox requiring all the relief and liberty that can be given in hot weather. The advocates for the collar insist upon the advantages of single ox carts; and ploughing with the team at length, by which, as they walk in the furrow, the land is not so much subject to be poached, as when they are yoked abreast. They affirm also that the pace is quicker in harness; and the animal works with greater ease. But their opponents allege that oxen are more advantageously worked in couples than singly; inasmuch as that, being nearer to the draught, they possess greater power over it than when drawing at length; they consider the additional expense occasioned by a double number of one-ox carts and drivers, as not counterbalanced by any advantage, even if any were admitted, in their use; and they deny that the animal works either quicker or with greater ease.

It would be endless to detail the various comparative trials that have been published on this long contested subject; and it may be deemed sufficient to state the result of two, made some years ago, in Sussex,

(Eng.) where, from oxen being extensively used, the dispute has excited more than common interest.

In order to decide the respective merits of the two methods, it was agreed that an acre of land should be ploughed by two teams, the one of six oxen in double yokes, the other of four oxen in collars; and then, again with four oxen in single yokes, against four in collars. In the first trial, the six in yoke beat the four in collar easily; and in the second, there were only three minutes difference. The work was equally well performed; but the ploughing must have been very light, as the last match was completed in four hours and ten minutes.

So far as this experiment may be considered decisive, it re-established the equality of the teams; but had it been tried by more severe labor, or on hilly ground, it might have proved different; and in steep ascents, more particularly, the yoke would probably have been found best adapted to the animal. It is a prevalent idea in England, that oxen are unfit for draught in hilly countries; but a large portion of the Peninsula is mountainous, and they there draw heavy weights in carts of a very rude construction. Being worked in yokes, they possess the power of preserving the line of draught, by lowering the head according to the inclination of the ground; an advantage which is lost by the application of the collar.

### ON GRAZING, SOILING, AND STALL FEEDING NEAT CATTLE.

The feeding and fattening of cattle, whether for labor or for sale, is the most important in the whole economy of the grass farm; hence the farmer should previously consider the *nature* and *fertility* of his *pastures*, and the extent and quality of his other resources; and, according to these, he ought to regulate his system of *grazing*, *soiling*, or *stall-feeding;* selecting, in the first instance, those beasts only which evince the most *thriving disposition to fatten with the least consumption of food*, and depasturing them upon such lands as are best calculated for the respective breeds; and especially taking care not to bring cattle from rich to inferior soils; but, wherever it is practicable, to choose them from lands of nearly the same quality as those destined for their reception; besides which precautions, it will be necessary, in all situations which are not provided with wholesome water, to avoid selecting cattle from those districts where that fluid abounds in a state of purity.

The introductory view of breeds prefixed to this work, will probably supply some hints for enabling the farmer to decide what sort of stock is calculated for peculiar situations; in addition to those remarks, we would observe, generally, from the practice of the most eminent graziers, that the larger beasts are preferable for the more luxuriant pastures; while, in such as are less rich, small stock answer best. Thus, a grazier who has fine and fertile pastures, may select his beasts as large as he can find them; provided they are of the right sort and shape. But it is requisite that those who are upon indifferent grass take care to proportion the *size* of their beasts to the *goodness* of their pastures; for it is preferable to have cattle rather too small than too large, because there are numerous tracts of ground which will be profitable for grazing such cattle, which are not capable of supporting large breeds.

FEEDING CATTLE.

With regard to the species of cattle best calculated for grazing, spayed heifers and oxen are certainly superior to any other stock; the former, indeed are of less frequent occurrence, though they fatten with more expedition. Many graziers consider heifers more kindly in their disposition to feed than steers; particularly when they have already had a calf; and some are of opinion that they are superior to oxen for fatting at any age, and that they will produce a greater weight of beef per acre.

In order to graze cattle to advantage, it ought to be a fundamental principle so to stock them that they may feed without restraint; beside which as often as opportunity or other circumstances will allow, it will be profitable to change them from one pasture to another, beginning with the most inferior grass, and gradually removing them into the best. By this experiment, as cattle delight in variety, they will cull the uppermost or choicest part of the grass, and by filling themselves quickly, as well as by lying down much, they will rapidly advance towards a proper state of fatness; while the grass which is thus left, may be fed off with laboring cattle, and lastly with sheep. Hence it will be advisable to have several enclosures, well fenced, and sheltered, and abundantly supplied with wholesome water.

Further, it will be of service to erect rubbing posts in different parts of the various enclosures, where stock are feeding; as such posts furnish them, no doubt, with an agreeable, and perhaps a salutary amusement, besides that they keep the cattle from the fences.

In the grazing of cattle a variety of circumstances will claim the farmer's attention, in order to conduct his business with regularity, or with profit. Hence he ought to take especial care not to turn his stock out into the pastures in the spring, before there is a full bite, or the grass has obtained a sufficient degree of length and maturity; for neat cattle, whose tongues enable them chiefly to collect the food, neither can, nor will bite near the ground, unless they are compelled by extreme hunger, in which case, it is obvious, they cannot enjoy their feed, and consequently cannot thrive in proportion.

Further:—where beasts are turned into fields, consisting either of clover entirely, or of a mixture of natural and artificial grasses, great circumspection is required to see that they do not eat so eagerly, or to such excess to become blown or hoven, an affection to which cows are more particularly liable than any other neat cattle. That disorder, however, may be prevented, either by feeding the animals so as to gratify the cravings of appetite before they are turned into the pasture, or by constantly moving them about the field for a few hours after they have been turned in, that the first ball at least may sink into their maw before the next be deposited.

It is also important to remove fattening cattle from time to time into fresh grounds; so that by taking the uppermost and choicest part of the grass, they may feed both expeditiously and thoroughly. The grass left behind them may be fed off first with laboring cattle, and afterwards with sheep. This last mentioned point cannot be too minutely regarded; for if cattle be in want, they will lose more flesh in one day, than they can possibly gain or recover in three. Hence those meadows or pastures, (particularly such as lie in fenny or other situations) which retain moisture for a long time, ought to be fed off as early as possible, lest

sudden or long continued rains descend, which will not only render the juices of the grass thin and watery, and ultimately putrescent, but which will also materially affect the health and constitution of the animals. To prevent the losses consequent on such accidents, it will, therefore, be indispensably necessary, daily and attentively to inspect the grazing stock; and if any beasts appear to be affected by eating wet grass, they should be immediately conducted into dry shelters, and fed with hay or straw; though if no shelter be conveniently at hand, they must be driven to the driest spot and there supplied with *sweet* cut grass, and *dry* fodder.

The *hard or light stocking of pasture ground*, is a point on which many experienced graziers are by no means agreed. By some, it is contended, that pastures ought to be stocked very lightly; alleging, that although much of the produce is thus allowed to run to seed, which the cattle will not eat, and which is consequently trodden under foot, where it is rotted by rain, and thus wasted; yet experience, say the advocates for *light stocking* evinces that a greater profit will, upon the whole, be thence derived, than by any other practice, on account of the superior thriving of the animals.

By others, on the contrary, it is maintained, that the practice of light stocking is highly to be condemned; because it not only tends gradually to diminish its produce, but also to encourage the growth of coarse and unprofitable grasses, which materially deteriorate the pastures, and that the *hard stocking* of grass lands, particularly those of a rich quality, is an indispensable requisite of good management.

It is recommended by a third party, (whose opinion, perhaps, approximates more nearly to the truth) that mixed stock should always be kept on the same field; for the foul grass produced by the dung of some animals, will be consumed by others: and as it is well known that different species of cattle prefer different kinds of grass, there is an evident advantage in this practice.

In every field, numerous plants spontaneously spring up, some of which are disliked by one class of animals, while they are eaten by others; and some of which plants, though eaten with avidity at a particular period of their growth, are entirely rejected by the same beasts at another period of their age. Hence it becomes necessary, not only to have a great variety of cattle in the same pasture, but also a very paricular attention is required to augment or diminish the proportions of some of these classes of animals at certain periods of the year; otherwise some part of the produce, will run to waste, unless, indeed, it be hard stocked to such a degree as to retard their thriving.

Where, however, a great variety of animals are allowed to go at large, in the same pasture, they rarely feed with that tranquillity which is necessary to ensure thriving. It frequently happens that one class or sort of beasts wishes to feed or to play, while others are inclined to rest; thus they mutually tease, and disturb each other; and this inconvenience is materially augmented, if any sort of *penning* or confinement be attempted. Hence it is obvious, that the practice of intermixing various kinds of live stock is productive of evils, which are, in many instances, greater than those resulting from the waste of food intended to be prevented by this practice. There is, indeed, no doubt but that by *hard stocking*,

the grass will be kept short, and will consequently be more palatable in general to the animals that eat it, than if it were allowed to grow to a great length; and that even unpleasant patches may be thus consumed; but as animals which are to be fatted, must not only have *sweet* food, but also an *abundant bite* at all times, in order to bring them forward in a kindly manner, it appears scarcely possible to unite both these advantages with an indiscriminate mixture of stock; it may, therefore, be generally prudent to confine the practice to neat cattle and sheep.

*Soiling* comes next to be considered. By this is meant, the feeding of animals with new mown grass, or grass not dried in racks or otherwise.

This method of keeping cattle is probably not generally applicable to the present state of agriculture in our country. It may be of use where fencing stuff is dear—where grass is of great value—where cultivation is carried to great perfection—where population treads close upon the heels of production. But even in the populous parts of New England, it is doubtful whether it can be adopted to advantage, except on lands in the vicinity of great cities, or on farms reduced to a state of great improvement and high cultivation, or on very small farms. A large proportion of the lands of New England, and indeed, in other parts of our country, are too rough and rocky to admit of any sort of cultivation, yet they answer well for pasture grounds, and to no other purpose can they be appropriated.

Still it is believed, that, under certain circumstances, soiling may be resorted to with great advantage. Within a few years, an experiment has been made by the Hon. Josiah Quincy, of Massachusetts, of soiling cattle, the result of which was communicated for the Massachusetts Agricultural Journal, and is published in vol. VI. Nos. II. and IV. of that work. According to Mr. Quincy, the advantages of soiling consist in, "1st. The saving of land. 2d. The saving of fencing. 3d. The economizing of food. 4th. The better condition and greater comfort of the cattle. 5th. The greater product of milk. 6th. The attainment of manure." For an illustration of these several particulars, we must refer our readers to the above work.

In respect to *stall feeding* neat cattle, it may be observed that good hay is undoubtedly the best for fattening cattle, when judiciously combined with cabbages, carrots, parsnips, turnips, or similar succulent plants, though hay will rarely be found capable of fattening animals, without the aid of other food, when finishing off for the market.

In England, great use is made of the cabbage, and which the Editors of the Complete Grazier say, will fatten oxen or bullocks, when combined with good hay, in the short space of five months, besides yielding a larger quantity of manure, than almost any other article used for winter food.

Parsnips, also, have been employed to considerable extent in England for fattening oxen, and the benefit thence derived in the estimation of some graziers is nearly equal to that derived from oil cake; but they are apt to cloy the appetite, and should therefore be given with other food; or, if alone, they should not be continued for a long time together.

Carrots, also, are an excellent root not only for fatting cattle, but also for milch cows, and even for working horses. The butter made from

cows fed on carrots, is said to be generally of an excellent quality, and much richer in color. On a good soil, and when well attended, carrots are often very productive.

Turnips, especially when steamed, also supply a nutritive article of winter food; though from their peculiarly moist nature, they will probably require to be combined with cut hay, to which a little meal may occasionally be added. In England, it is well known, turnips are much more abundantly used than in this country. Great numbers of cattle it is said, are annually fatted for the London market on little other food than turnips.

Much has been written on the Mangle-wurzel, or root of scarcity, both in this country and in Europe. Some years since, the highest expectations were formed in Britain respecting its usefulness, as an article of fodder. Although highly esteemed in that country, especially for cows, it is not so much valued, perhaps, as in some parts of the continent, where it is preferred for feeding cattle to every other root. In this country, it is now frequently raised, and deserves to be cultivated still more than it is. In the opinion of the editors of the Complete Grazier, it does not fat cattle as fast as the potato, and some other roots.

In this country, potatos are extensively used for the stall feeding of cattle. They are generally given in a raw state, but would doubtless answer a better purpose if steamed. It is sometimes difficult to give cattle a sufficient quantity, in consequence of their causing them to scour. When this happens, meal or other dry food should be administered, and the quantity of potatos for the time diminished. The editor of this work has known an ox of middle age to be fatted surprisingly quick, on hay of good quality and raw potatos. No other article of food was given, and during the process of fattening not a gallon of water was given to the animal.

Besides the above vegetable productions, others might be mentioned, such as the ruta baga, or Swedish turnip, sugar beet, &c. which are highly valued in many parts of the country. Passing over a more extended notice of these, we proceed to detail a few hints respecting other articles which are or may be likewise employed with advantage. For this purpose linseed oil cake has long been celebrated as eminently useful; it is asserted to have a very extraordinary effect on cows, greatly increasing their milk; but it is said that linseed jelly is much superior to the cake, and that when mixed with a due proportion of hay or meal, affords an excellent composition for stall feeding and fattening. It is prepared in the following manner: To seven parts of water let one part of linseed be put, for forty-eight hours; then boil it slowly for two hours, gently stirring the whole lest it should burn. Afterwards it ought to be cooled in tubs and mixed with meal, bran, or cut chaff, in the proportion of one bushel of hay to the jelly produced by one quart of linseed, well mashed together. This quantity given daily, with other food, will forward cattle rapidly; but it must be increased when they are intended to be completely fattened.

The above jelly is said to be more agreeable to cattle than cake, while it renders them less liable to surfeit, in case an extra quantity should be accidentally given, and is less liable to affect the meat with a peculiar taste than either oil or cake, and consequently it merits a trial: but it

will be requisite to change this food about a month before the beast is killed, to prevent, if possible, the flesh from retaining the flavor of the oil cake or jelly.

Cattle fed on sour food, prepared by *fermenting rye flour and water* into a kind of paste, and then diluted with water, and thickened with hay cut small, are also said to fatten quickly. This practice chiefly prevails in France. Concerning the efficacy of acid food in fattening animals, there is much difference of opinion. It is well known that hogs derive more benefit from sour milk and swill, than when those articles are in a fresh state; and it is highly probable that sour articles may contribute to promote digestion, and by facilitating the consumption of a large quantity of food in a stated period, consequently expedite the fattening of cattle. *Brewer's grains* are sometimes used in that state, but *distiller's* grains differ from them in having a proportion of rye frequently mixed with the malt, which renders them more naturally sour. But such acid messes can only, we conceive, be considered as preparatory to the more forcing and essential articles of dry food; without which, it is scarcely possible that any steer or bullock can acquire that firmness of muscle and fat which is so deservedly admired, and considered as the criterion of excellence.

The *wash*, or refuse of malt, remaining after distillation, which was formerly applied exclusively to the feeding of swine, has of late years been applied with success to the stall feeding of cattle. It is conveyed from the distillery in large carts, closely covered and well jointed, in order to prevent leaking. The liquor is then discharged into vats, or other vessels, and when these are about two-thirds filled, a quantity of sweet hay, previously cut small, is immersed for two or three days, that the wash may imbibe the taste or flavor of the hay before it is used. In this state it is carried to the stalls, and poured into troughs, whence it is generally eagerly eaten by cattle. Sometimes, however, the beasts are at first averse to this mixture, in which case it has been recommended frequently to sprinkle their hay with the wash; thus, having the smell continually before them, and seeing other animals eating the same composition with avidity, they gradually become accustomed to it, and at length greatly relish it. The cattle fed in this manner are asserted not only to repay the expense of their keeping by fattening speedily, but also yield a large quantity of valuable manure.

With equal success has *molasses* or *treacle* been employed; though the expense incurred by the use of this article will probably prevent its general adoption in this country. It has been used in the West Indies, in combination with farinaceous substances, and, when these could not be procured, with cane tops, oil cake, and other articles of dry food, together with a little hay, or not too green fodder, and has been found greatly to expedite the fattening of cattle in general, and of old and decayed oxen in particular; in the proportion of half a pint to a pint of molasses, twice in the day, to animals which have been exhausted by continual and severe labor, for a long series of years.

In the preceding facts and statements, we have referred chiefly to the feeding and fattening of middle aged and old cattle; *young stock*, however, require particular attention, lest their growth be impeded—which no summer food can restore—and therefore should be fed on the best and most nutritive food the farm can supply. Hence, yearlings should

be fed during the winter with hay, turnips, carrots, potatos, or other roots; where hay cannot be obtained, good straw must be substituted, the proportion of roots being increased and given with attention. For steers and heifers two years old, the proper food is hay, if it be cheap, or straw, with baits of turnips, cabbages, carrots, &c. In summer their food varies so little from that above specified, as to require no particular details on this head.

With regard to oxen used in draught, it should be observed, that they ought to be well fed, and every attention bestowed, that no food be wasted, while they are to be kept in constant employ, particularly in the commencement of spring, and in autumn, when their labor is most wanted.

Some farmers, indeed, endeavor to support working oxen on straw alone, and the possibility of this is one great argument used in favor of their employment; but it will be generally found to injure them in a greater proportion than the saving in food.

Next to a proper stock of keep for cattle, is *regularity in giving them food*. In stall feeding, it is too common a practice to give a certain mess, or allowance, every day, without regard to any circumstance; the absurdity of which conduct is too obvious to be here pointed out. It is a fact, that a bullock, or a fattening beast, will eat with a keener appetite on a cold day, than in warm damp weather; hence his food ought to be proportioned accordingly. By giving the same quantity every day, the animal may be cloyed; thus his appetite becomes impaired, the food is wasted, and several days will necessarily elapse before he can recover his natural appetite. By such delay, he must fall away, and many weeks, perhaps months, will be required to bring him to his former flesh.

Animals have been not uncommonly supposed to consume a quantity of food in proportion to their weight; but this is purely theoretical; for in fact, various experiments have proved that although small cattle may be supported on pastures that will not carry heavy beasts, and also on more indifferent soiling food, yet, when put up to fatten, the difference is of no account in proportion to their weight; though cattle of the same weight and breed will sometimes consume different quantities.

But whatever articles of food may be given, they ought to be apportioned with as much regard to regularity of time and quantity as is practicable; and if any small part be at any time left unconsumed, it should be removed before the next feed is given, otherwise the beast will loath it. Hence, three periods of the day, as nearly equi-distant as possible, should be selected, when such an allowance should be given to each animal as he can eat with a good appetite; which point can be regulated best by attending duly to the state of the weather or season, and the progress he makes in flesh; for as he fattens, his appetite will become more delicate, and he will require more frequent feeding, in smaller quantities; thus the beast will improve progressively and uniformly, while a trifling loss of food only can occur by this method.

Of equal if not superior importance with regularity of feeding, is *cleanliness*, a regard to which is admitted, by all intelligent breeders, to be one of the most essential requisites to the prosperity of cattle. The mangers and stalls should be kept as clean as possible; and the for-

mer especially, should be cleared every morning, from dust and filth; otherwise, they acquire a sour and offensive smell from the decay of vegetable matter left in them; which nauseates the cattle and prevents their feeding. After the stalls have been cleansed by constantly removing the dung and sweeping the pavement, a sufficient quantity of fresh litter ought to be strewed over, which will invite them to lie down; for nothing contributes more to expedite the fattening of cattle, than moderate warmth, ease and repose. In fact, where straw can be obtained at a moderate price, supposing the farm does not yield an adequate supply for this purpose, the stalls and farm yards ought always to be well littered, especially during the winter season.

The quantity of manure thus made is an essential object: for it has been found that forty-five oxen, littered, while fatting, with twenty waggon loads of stubble, have made two hundred loads, each three tons, of rotten dung. Every load of hay and litter given to beasts fatting on oil cake, yields seven loads of dung, of one ton and a half each, exclusive of the weight of the cake. And on comparing the dung obtained by feeding with oil cake with that of the common farm yard, it has been found that the effects produced by spreading twelve loads of the former on an acre, considerably exceeded those of twenty-four loads of the latter manure. It is, in fact, invariably found that the value of the manure is in proportion to the nutriment contained in the aliment. By another trial, it appears, that thirty-six cows and four horses, when tied up, ate fifty tons of hay, and had twenty acres of straw for litter; they made two hundred loads of dung, in rotten order, for the land; a difference in weight which is accounted for by the absorption of moisture, by straw.

## SECTION II.

### ON THE ECONOMY AND MANAGEMENT OF THE DAIRY.

#### OF MILCH KINE, AND OF THE PASTURE AND OTHER FOOD BEST CALCULATED FOR COWS, AS IT RESPECTS THEIR MILK.

We have already had occasion to remark, that the farmer should take especial care to select his stock with reference to the great object he has in view. This is eminently true in respect to the particular branch of dairying which he means to pursue; for if his object be to sell or suckle calves, *quantity* must be the material consideration; and *quality*, if he means to produce butter and cheese.

It is a general observation, that the richest milk is produced by the red cow, while the black sort is reckoned best for the purposes of breeding, as her calf is usually both stronger and more healthy than the offspring of the red species. This, however, is one of those errors which have been transmitted through a long series of years, without being founded on fact. The red cows have indeed been long celebrated for the ex-

cellency of their milk; and the calves of black cows have been proverbially deemed good; but color in this respect is a matter of no moment; the *breed* alone should claim the farmer's attention. But cows even of the same, and the best breeds, will not always yield the same quantity of milk; and of those which yield the most, it is not unfrequently deficient in richness. Trials are, however, easily made, by keeping the cows on the same food, weighing the quantity consumed by each, and measuring their milk; then keeping and churning it, a few times, separately; thus, reckoning the cost of the provender, and the produce of the milk of each, and comparing the result, it will be soon discovered which is the most profitable animal. Comparisons of this kind are not often made; for farmers usually purchase whatever stock they can most conveniently, or most cheaply lay their hands on; and are then content to keep them so long as they turn out tolerably well. This, however, is the height of bad economy; for an indifferent cow will eat as much and require as much attendance as the best; and thus occasions a daily loss that will soon exceed any probable saving in the original price; whereas the man who takes the pains to acquire a good stock, and has the sense to keep it, lays the sure foundation of a fortune.

Whatever breed may be selected, there is still a material distinction to be observed between the form of a cow, intended for the dairy, and that of one intended for fatting. While the latter should possess, as nearly as possible, all the most remarkable points already described, of the best oxen, the milch cow should, on the contrary, be thin and hollow in the neck; narrow in the breast, and point of the shoulder, and altogether light in the fore quarter; with little dewlap, and neither full fleshed along the chine, nor shewing, in any part, much indication of a disposition in any part to put on fat. The hide should be thin, the hair fine, and the tail small. But especially the udder should be full and round, yet thin to the touch, and should be of equal size and substance throughout. If it shews more behind than before, it is deemed a sign of the milk falling off soon after calving, and if it feels coarse and lumpy, the bag will be found not to contain a large quantity. The teats should stand square, at equal distances, and should be neither very large nor very thick towards the udder, but nearly equal, yet ending in a point. Another very material consideration is the temper; for kindly cows will not only give less trouble than those of an opposite disposition, but they are generally marked to possess a greater quantity of milk; and from parting with it more readily, they are less subject to fall off in their milking.

As the nature of the grass, or other vegetables, has a very considerable influence both on the quality and on the quantity of milk which cows produce, the attention of the industrious farmer will of course, be directed to this point; for, as instances have occurred, where six milch kine, fed on some pastures, have yielded as much milk as nine, or even a dozen will afford on an inferior ground, it is obviously his interest to have his cows well fed and in good condition, rather than to keep up a particular number, without heeding whether they are properly supplied or not. Hence, it will be proper to suit the milch cows to the nature and fertility of the soil; and on no account to purchase them from pastures superior to those destined for their reception.

The feeding of milch kine is divided into two branches, viz. *pasturing* and *house feeding*.

MANAGEMENT OF THE DAIRY.

In order to obtain an abundant supply of good milk, where the pasturing of cows is adopted, they ought uniformly to be well fed; for this purpose, grass growing spontaneously on good, sound, meadow land, is in general deemed the most proper food. Another requisite is, that the grass be plentifully produced, and of that quality which is relished by the cattle. This property will generally be found in old natural pastures that have been properly managed.

Long, rank grass, growing in orchards or other places, in general feeds well, and produces a flush of milk, yet such milk will neither be so rich, nor carry so much cream in proportion, as the milk of those cows which are fed upon short fine grass; nor, of course, will their butter be so good.

Further, the quality and quantity of milk is materially affected by driving them to a distance from one pasture to another; hence it will be proper to have the cow sheds in as central a part of the farm as possible. It is also of essential importance to have pastures inclosed, as the produce of milch kine will be greatly improved, or deteriorated, according to the attention or disregard bestowed on this point, for, when confined within proper enclosures, they not only feed more leisurely, but are also less liable to disturbance than when they wander into other fields.

In summer, milch cows need less care; but in winter they should be stabled, or at least should have warm sheltered yards, furnished with open sheds, in which they can feed without exposure to the severities of the weather; a measure, of which the expense will be more than counterbalanced by the increased quantity of milk which they will yield.

In the management of milch kine, it is essential that they be, at all times, as has been observed in the preceding page, kept in high health, and good condition; for if they are suffered to fall in flesh during the winter, it will be impossible to expect an abundant supply of milk by bringing them into a high condition in the summer. Hence, if cows are lean when calving, no subsequent management can bring them to yield, for that season, any thing like the quantity they would have furnished, in case they had been well kept throughout the winter. During that inclement season, therefore, the most nutritious food should be provided for them, and the animals kept in warm stables; for beasts will not eat so much when kept warm, as when they are shivering with cold; and if they are curried in the same manner, and kept cleanly as horses in a stable, the happiest consequences will ensue, both in regard to the milk they yield, and the rapid improvement of the cows themselves. Such is the practice pursued in Holland, where it is well known that the management of cows is carried to the highest perfection; and if that be closely followed, if they be well supplied with the purest water, kept very clean, and laid dry, they will produce milk more copiously, and afford a quantity of rich manure that will amply repay the trouble and attention thus bestowed on them.

It has already been intimated that the best summer food for cows is good grass, spontaneously growing on sound meadows. The other additions to hay for winter food are those most commonly employed for fatting cattle; *parsnips* and *carrots*, which roots not only render the milk richer, but also communicate to the butter made from such milk, a fine color, equal to that produced by the most luxuriant grasses: the *mangel wurtzel*, which, on the continent, is preferred to every other vegetable, for

feeding cattle in general:—*potatos*, on which cows will thrive well, so that with one bushel of these roots, together with soft meadow hay, they have been known to yield as large a quantity of sweet milk or butter, as they usually afford when fed on the finest pastures; but alone, it has been proved by various experiments, that potatos will not support a cow in milk; they may add to the flow of it when given to a cow with hay, but the chief dependence must be upon the latter; *carrots* are far superior. *Cabbages* are likewise of eminent service in this respect, but they require to be given with a good portion of fine hay; and as well as *turnips*, the utility of which is too well known to require any particular detail here, they are apt to impart an unpleasant flavor to the butter, unless great care be taken to remove all the decayed leaves. And even then, if a cow be in any wise full fed on turnips, her milk, and the butter made from it, will taste of it. To avoid this taste in the butter, the following recipe from Hunter's Georgical Essays may be found useful. "Let the vessels in which the milk is put, be kept constantly clean and well scalded with boiling water before using. When the milk is brought into the dairy, to every eight quarts of milk, mix one quart of *boiling water*: then put up the milk into the pans to stand for cream."—*Rowen* grass, also, dried and reserved for winter's use, is an excellent food for milch cows; as are *oil cakes*, *linseed jelly*, and *grains*. By the judicious use of these various articles, together with a due admixture of dry food, considerable nutriment is thrown into the system, while the regular secretions will be excited, and the quantity of the milk very materially improved.

It is important, also, that due attention should be paid to the *salting* of cows, as well as other cattle. The advantages of salt are

I. It restores the tone of the stomach when impaired by excess in other food, and corrects the crudity of most vegetables and grasses in a green state.

II. It helps digestion, keeps the body cool, by which many disorders are prevented; and destroys botts.

III. It renders inferior food palatable; and is so much relished by cattle, that they seek it with eagerness in whatever state it may be found, and have been rendered so tame by its use, that if they stray from their pastures, they will return at the usual time for their accustomed allowance.

IV. When given to cows, it increases the quantity of their milk, and has a material effect in correcting the disagreeable taste it acquires from turnips.

### OF THE MANAGEMENT OF MILK AND CREAM; AND THE MAKING AND PRESERVING OF BUTTER.

Before speaking of the management of milk and cream, it will be proper to make a few observations on the *Situation and Buildings proper for a Dairy.*

I. A dairy ought, if possible, to be so arranged that its lattices may never front the south, south-west, south-east, or west; a northern aspect is the best; but there should be openings on two sides of the building, in order to admit, when necessary, a free current of air.

II. The temperature of the milk room should be as nearly uniform as possible, that is, from fifty to fifty-five degrees of Fahrenheit's ther-

mometer. This may be effected by making use either of a well ventilated cellar, or of a house constructed for the purpose, consisting of double walls, so thick as not to subject the interior to the changes of temperature abroad.

III. As great cleanliness is requisite, and at the same time coolness, the floor should be made of stones, bricks, or tiles, in order that it may be frequently washed, both to sweeten and to cool the air.

IV. If practicable, a small current of water should be so introduced, as to run in a constant stream along the pavement. This will contribute much to preserve the air pure, fresh and cool. If a current of water cannot be obtained, an ice-house should be attached to the dairy.

V. Cream which is put by for churning ought never to be kept in that apartment which contains the milk; because acidity in cream is expected, and necessary before butter will come.

VI. If necessary at any time during the winter months to raise the temperature of the milk room, hot water should be made use of, or a few hot bricks; but on no account whatever should a chafing-dish with burning coals be used, as it will certainly impart a bad taste to the milk.

We shall now proceed to speak of the management of milk and cream, and the making and preserving of butter.

In this country it is the general practice to milk cows twice in the course of twenty-four hours, throughout the year; but in summer, the proper periods are at least three times every day, and at intervals as nearly equi-distant as possible; viz. in the morning, at noon, and little before the approach of night. For it is a fact confirmed by the experience of those who have tried it, that cows when milked thrice in the day, will yield more milk in point of quantity, and as good, if not better quality, than they will under the common mode of milking only on the morning and evening.

With regard to the process of making butter we would observe:

I. The milk first drawn from a cow is always thinner and inferior in quality to that afterwards obtained, and this richness increases progressively, to the very last drop that can be drawn from the udder.

II. The portion of cream rising first to the surface, is richer in point of quality, and greater in quantity, than that which rises in the second equal space of time, and so of the rest; the cream continually decreasing, and growing worse than the preceding.

III. Thick milk produces a smaller proportion of cream, than that which is thinner, though the cream of the former is of a richer quality. If thick milk, therefore, be diluted with water, it will afford more cream than it would have yielded in its pure state, though its quality will at the same time be inferior.

IV. Milk carried about in pails or other vessels, agitated and partly cooled before it be poured into the milk pans, never throws up such good and plentiful cream as if it had been put into proper vessels immediately after it came from the cow.

From these fundamental facts, many very important corollaries, serving to direct the practice, may be deduced, among which we can only notice the following:

## MAKING AND PRESERVING BUTTER.

I. It is evidently of much importance that the cows should be always milked as near the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes: and as cows are much hurt by far driving, it must be a great advantage to a dairy farm, to have the principal grass fields as near the dairy or homestead as possible. In this point of view, also, the practice of feeding cows in the house, rather than turning them out to pasture in the field, must appear to be obviously beneficial.

II. The practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, there to remain till the whole milking be finished, before any part is put into the milk pans, seems to be highly injudicious, not only on account of the loss sustained by the agitation and cooling, but also, and more especially, because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to enlighten his judgment respecting the profit that he may derive from each. Without this precaution, he may have the whole of his dairy produce greatly debased by the milk of one bad cow, for years together, without being able to discover it. A better practice, therefore, would be to have the milk drawn from each cow separately, put into the creaming-pans as soon as milked, without being ever mixed with any other; and if these pans were all made of such a size as to be able to contain the whole of one cow's milk each in a separate pan, the careful dairy-woman would thus be able to remark, without any trouble, the quantity of milk afforded by each cow every day, as well as the peculiar qualities of the cow's milk. And if the same cow's milk were always to be placed on the same part of the shelf, having the cow's name written beneath, there never could be the smallest difficulty in ascertaining which of the cows it would be the owner's interest to dispose of, and which he ought to keep and breed from.

A small quantity of clear water, cold in summer, and warm in winter, put into the bottom of a milk-pan, is said to assist the rising of the cream.

III. If it be intended to make butter of a *very fine quality*, it will be advisable, not only to reject entirely the milk of all those cows which yield cream of a bad quality, but also, in every case to keep the milk that is first drawn from the cow, at each milking, entirely separate from that which is got last; as it is obvious, if this be not done, the quality of the butter must be greatly debased, without much augmenting its quantity. It is also obvious, that the quality of the butter will be improved in proportion to the smallness of the quantity of the last drawn milk which is used, as it increases in richness to the very last drop that can be drawn from the udder at that time; so that those who wish to be singularly nice, will do well to keep for their best butter a *very small* proportion only of their last drawn milk.

With respect to the *operation of churning*, we would particularly remark, that it ought to be regularly continued, till the butter is *come*, or formed; nor, unless from absolute and irremediable necessity, should any assistant be allowed to churn; because, if the motion be, in summer, too quick, the butter will in consequence ferment and become ill-tasted; and, in winter, it will *go back*. The business of churning may, however, be much facilitated by immersing the pump-churn, (if such be

employed) about one foot deep into a vessel of cold water, and continuing it there till the butter is made. Where other churns are made use of, the addition of one or two table spoons full of distilled vinegar, after the cream has been considerably agitated, will, it is said, produce butter in the course of an hour. After the butter is formed, the usual practice is to wash it in several waters, till all the milk is removed; but some advise the milk to be forced out of the cavities of the butter, by means of a flat, wooden ladle, furnished with a short handle, at the same time agitating the butter as little as possible, lest it become tough and gluey. The beating of butter up by the hand is an indelicate practice; and, as it is hurtful to the quality of the butter to pour cold water on it during this operation, the butter if too soft to receive the impression of the mould, may be put into small vessels, and these be permitted to float in a trough of cold water beneath the table, *without wetting the butter*, which will soon become sufficiently firm. Or, when butter is first made, after as much of the milk has been got out as possible, it may be thinly spread on a marble slab, and the remaining moisture be absorbed by patting it with clean dry towels.

Dr. Anderson observes that wooden vessels are most proper for containing salted butter. Oak is said to be the best kind of wood. Iron hoops should not be used, as the rust of them will sink through the wood and injure the butter. It is difficult to season new vessels, and therefore it is best to use old ones as long as they will last. Unslacked lime, salt and water well boiled, hot water and wood ashes, are recommended for scouring them. The vessels having been repeatedly scrubbed with some or all of these, should afterwards be thrown into cold water, to remain three or four days, or till wanted. They should then be scrubbed as before, and well rinsed with cold water, and before the butter is put in, every part of the inside should be well rubbed with salt.

Dr. Anderson's famous recipe for preserving butter, has been often published, but it may not be amiss to give it again, as things of the greatest utility are a long time in making their way to general adoption. "Best common salt, two parts; saltpetre, one part; sugar, one part—beat them up together, so that they may be completely blended. To every pound, or sixteen ounces of butter, add one ounce of the composition. Mix it well with the mass and close it up for use." Butter prepared in this manner will keep for years, and cannot be distinguished from that recently salted. It should, however, be remarked, that butter thus cured does not taste well, till it has stood a fortnight or three weeks. Dr. Anderson remarks, that he has found by experience, that the above mentioned composition not only preserves the butter more effectually from any taint of rancidity, but makes it also look better, taste sweeter, richer and more marrowy, than if it had been cured with common salt alone.

A writer in the New England Farmer proposes an alteration, which he considers an improvement in the above recipe of Dr. Anderson, namely, that the sugar made use of, should be *loaf* sugar, and that the salt should be well dried before weighing it.

When butter is put into firkins, or other vessels for preservation, it should be so closely packed and crowded, that no air can come in con-

tact with it. The butter should be carefully covered with a piece of fine cloth, previously dipped in melted sweet butter. When more is put into the tub, take up the cloth; and after that is well crowded in, and levelled, put on the cloth again, so nicely as to shut out the air. When the tub is filled in this manner, pour a little melted butter over the surface to fill every vacancy, before the top is put on.

"For keeping butter sweet that is salted in the usual way," says the Farmer's Guide, "it should be salted with an ounce and a half more of the strongest and best salt, finely powdered, to each pound, and so thoroughly mixed that every part may be equally salt; made into rolls, and then put into a cask of pure strong brine; and for keeping the rolls completely immersed in this liquid, there should be a cover, suitable to the dimensions of the inside of the cask, to be laid on the rolls, and sunk beneath the surface of the brine by a weight, which may be a block of wood fastened to the cover, that will sink only to a given depth. The brine does not penetrate the butter so as to give out an additional saltness. For clarifying the brine, it should occasionally be scalded, the scum taken off, and more salt added if necessary. Butter made in May is observed to be best for keeping.

## OF THE MAKING AND PRESERVATION OF CHEESE.

The goodness of cheese, as well as of butter, depends much on the quality of the milk: though the season, and particular process adopted in making it, also have a very considerable influence upon it in this respect—more, perhaps, than the material of which it is prepared. We shall, therefore, briefly notice these circumstances; and, as different modes of making cheese are practised in different countries or places, we shall then concisely state those which are more particularly deserving of notice.

The best *season* for this purpose is from the commencement of May till the close of September; or, under favorable circumstances, till the middle of October; during which interval, cows are, or can in general, be pastured. In many large dairies, indeed, cheese is often manufactured all the year round; but the winter cheeses are much inferior in quality to those made during the summer months; but there is no doubt but that good cheese may be made throughout the year, provided the cows be well fed in the winter.

With regard to the *rennet*, as no good cheese can be made without it, great attenion is necessary in preparing it for coagulating the milk. Strictly speaking, rennet is the coagulated lacteous matter, or substance, found in the stomach or maws of calves that have been fed only with milk, and which was formerly used in coagulating milk; though it is, in a more extensive sense, applied to the *bait*, *vell*, *maw* or *stomach*, as it is variously termed, which possesses the same properties; and which is now invariably used for that purpose.

Dairy women usually preserve the maw, and the curd contained in it, after salting them, and then, by steeping this bag and curd, make a rennet, to turn their milk for making cheese. But a more simple method, and which is equally good in every respect, is to throw away the curd, and, after steeping it in pickle, stretch out the maw, upon a slender bow

inserted into it, which will soon be very dry, and keep well for a long time. Take an inch or two of the maw thus dried, and steep it over night in a few spoons full of warm water, which water serves full as well as if the curd had been preserved for turning the milk. It is said that one inch will serve for the milk of five cows.

An ingenious writer who has made strict inquiry into this subject, recommends the following method of preparing a rennet, which he has found to be better than any other: "Throw away the natural curd, which is apt to taint and give the curd a bad smell; then make an artificial curd, or rather butter, of new cream, of sufficient quantity to fill the bag. Add three new laid eggs well beaten, one nutmeg grated fine, or any other good spice; mix them well together, with three tea cups full of fine salt; fill the rennet bag with this substance, tie up the mouth, lay it under a strong brine for three days, turning it over daily. Then hang it up in a cool and dry place for six weeks, and it will be fit for use. When it is used, take with a spoon out of the bag a sufficient quantity of this artificial butyrous curd for the cheese you propose to make, dissolve it in a small quantity of warm water, and then use it in the same manner as other rennet is mixed with the milk for its coagulation."

In the Bath papers, Mr. Hazard gives the following recipe for making rennet: "When the raw skin is well prepared and fit for the purpose, three pints of soft water, clean and sweet, should be mixed with salt, wherein should be put sweet briar, rose leaves and flowers, cinnamon, mace, cloves, and almost every sort of spice; and if these are put into two quarts of water, they must boil gently, till the liquor is reduced to three pints, and care should be taken that this liquor is not smoked. It should be strained clear from the spices, &c. and when found to be not warmer than milk from the cow, it should be poured upon the cawl or maw; a lemon might be sliced into it, where it may remain a day or two; after which it should be strained again and put into a bottle, where if well corked, it will keep good for twelve months. It will smell like a perfume, and a small quantity of it will turn the milk, and give the cheese a pleasing flavor." He adds, "if the maw be salted and dried for a week or two near the fire, it will do for the purpose again, almost as well as before."

Another recipe is as follows: after the maw has been well cleansed, and salted, and dried upon sticks or splints, take boiled water, two quarts, made into a brine that will bear an egg. Let it be blood warm, and put in the maw either cut or whole; let it steep twenty-four hours, and it will be fit for use. About a tea cup full will turn the milk of ten cows. It should be kept in glass bottles well corked.

The Massachusetts Agricultural Repository still gives another recipe for making rennet, which is as follows. The rennet is prepared by taking some whey and salting it till it will bear an egg; it is then suffered to stand over night, and in the morning it is skimmed and racked off clear; to this is added an equal quantity of water brine, strong as the whey, and into this mixture, some sweet briar, thyme, or other sweet herbs, also a little black pepper and salt petre; the herbs are kept in the brine three or four days, after which it is decanted clear from them. Into six quarts of this liquor four large calves' bags, or more properly called calves' stomachs, are put. No part of the preparation is heated, and frequently the calves' bags are only steeped in cold salt and water.

MAKING AND PRESERVATION OF CHEESE.

But whatever kind of rennet the dairy woman may choose to prepare, it should be remembered, that this animal acid is extremely apt to become rancid and putrescent, and that great care is necessary to apply a sufficient quantity of salt to preserve it in its best state. The rank and disagreeable taste too frequently found, is often caused by the rennets having been badly preserved.

In respect to the process of making cheese, the Massachusetts Agricultural Repository gives the following directions.

The milk is universally set for cheese as soon as it comes from the cow. The management of the curd depends on the kind of cheese; thin cheese requires the least labor and attention.

Breaking the curd is done with the hand and dish. The finer the curd is broken the better, particularly in thick cheeses. The best color of this kind of cheese is that of beeswax, which is produced by annotto, rubbed into the milk after it is warmed. The dairy woman is to judge of the quality by the color of the milk, as it differs much in strength. Turning the milk differs in different dairies; no two dairy women conduct exactly alike.

Setting the milk too hot inclines the cheese to heave, and cooling it with cold water produces a similar effect. The degree of heat varies according to the weather. The curd, when formed, is broken with what is called a triple cheese knife. The use of this is to keep the fat in the cheese; it is drawn the depth of the curd two or three times across the tub, to give the whey an opportunity of running off clear; after a few minutes the knife is more freely used, and the curd is cut into small pieces like chequers, and is broken fine in the whey with the hand and a wooden dish. The curd being allowed about half an hour to settle, the whey is laded off with the dish, after it is pretty well separated from the curd.

It is almost an invariable practice to scald the curd. The mass is first broken very fine, and then the scalding whey is added to it, and stirred a few minutes; some make use of hot water in preference to whey, and in both cases heated according to the nature of the curd; if it is soft, the whey or water is used nearly boiling; but if hard, it is only used a little hotter than the hand. After the curd is thoroughly mixed with the hot stuff, it is suffered to stand a few minutes to settle, and is then separated, as at the first operation. After the scalding liquor is separated, a vat, or what is often called a cheese hoop, is laid across the cheese ladder over the tub, and the curd is crumbled into it with the hands, and pressed into the vat, to squeeze out the whey. The vat being filled as full and as firmly as the hand alone can fill it, and rounded up in the middle, a cheese cloth is spread over it, and the curd is turned out of the hoop into the cloth; the vat is then washed, and the inverted mass of curd with the cloth under it, is returned into the vat and put into the press; after standing two or three hours in the press, the vat is taken out, and the cloth is taken off, washed and put round the cheese and replaced in the vat and in the press. In about seven or eight hours it is taken out of the pressand salted, the cheese is placed on a board, and a handful of salt rubbed all over it, and the edges are pared off if necessary; another handful of salt is strewed on the upper side, and as much left as will stick to it; afterwards it is turned into the bare vat without a cloth, and an equal quantity of salt is added

to it and the cheese is returned into the press. Here it continues one night; and the next morning it is turned into the vat, and continues till the succeeding morning, and the curd is taken out and placed on the dairy shelf; here they are turned every day, or every other day, as the weather may be. If it is hot and dry, the windows and doors are kept shut; but if wet or moist, the doors and windows are kept open night and day.

*Cleaning the cheese.*—The cheeses having remained about ten days after leaving the press, are to be washed and scraped in the following manner: a large tub of cold sweet whey is placed on the floor, the cheeses are immersed in it, where they continue one hour, or longer, if necessary to soften the rind. They are then taken out and scraped with a common case knife, with great care, so as not to injure the tender rind, till every part of the cheese is smooth; they are after the last ope- [illegible] the whey and wiped clean, with a coarse cloth, and pla- [illegible] which they are placed in the cheese [illegible] with

When fifty years afterwards, Abraham journeyed to Mount Moriah, to offer up his only son, he rode upon an ass; which with all his wealth and power he could scarcely have done had the horse been known. Gen. xxii. 3.

Thirty years later, when Jacob returned to Isaac with Rachel and Leah, an account is given, Gen. xxxii. 14, of the number of oxen, sheep, camels, goats, and asses, which he sent to appease the anger of Esau, but not one horse is mentioned.

It was not until twenty-four years after this, when the famine devastated Canaan, and Jacob sent into Egypt to buy corn, that horses are first heard of. "Wagons," probably carriages drawn by horses, were sent by Joseph into Canaan, to bring his father to Egypt. It would seem however, that horses had been but lately introduced, or not [illegible] beasts of burden; for the whole of the corn [illegible] some hundred miles, and [illegible] household [illegible]

Barb is decidedly superior to the Arab in form, but has not his spirit, or speed, or countenance.

The barb has chiefly contributed to the excellence of the Spanish horse; and when the improvement of the breed of horses began to be systematically pursued in Great Britain, the Barb was very early introduced. The Godolphin Arabian, as he is called, of whom we here present our readers with a cut and who was the origin of some of the best English racing blood, was a Barb; and others of their most celebrated turf-horses, trace their descent from African mares.

THE GODOLPHIN ARABIAN.

As to the manner in which the above horse was introduced into England, different accounts have been given. According to one writer,* his introduction was by means of a Col. Coke, an Englishman of fortune and education, who, on account of several crimes, was obliged to flee from England, and during his absence, travelled into Syria, and thence into Arabia.

In this latter country he accidentally heard of the above horse, which it was stated belonged to a certain "Sheik." He visited the Sheik, but was unable to purchase him on account of the great value put upon him. He contrived, however, to steal him—made his escape—reached Damietta, a seapot near the mouth of the Nile, whence he sailed with the horse, and took up his residence in France, until he could appear in England and be restored to his family.

The Earl of Godolphin was, at this time, prime minister of England. To him Coke addressed several letters, but his Lordship paid no attention to them. At length, by some means, Coke discovered that his Lordship, at that season of the year, was affected with the gout, and daily took an airing in his carriage, in Hyde Park, London—he wrote to his Lord-

* American Farmer, vol. IX., p. 134.

ship, that at a particular time and place in said park, he would see a man, (describing his stature and dress, riding a beautiful brown horse, which he also described, having his off heel behind, white,) who had no designs whatever on his person, but, on the contrary, a great friendship for him, who wished to have an interview with him, and that when his Lordship in his next ride saw him, he, the said Coke, would take it as a particular favor, if his Lordship would direct his outriders to withdraw, so that the interview as aforesaid, might be effected.

The next day Lord Godolphin took his usual jaunt—at the place and time appointed he saw Col. Coke, who, after the withdrawal of the outriders, rode up to his Lordship's carriage, and after making his obeisance asked him respecting the receipt of his former letters; his Lordship answered in the affirmative.

Col. Coke immediately dismounted, and made his Lorpship another low bow, and in a very condescending manner told him, that from hearing of his Lordship's very great partiality for being possessed of the finest horses in the kingdom, he, after travelling several years in Arabia, had brought over the very finest and best bred horse in the whole world, as a present for him.

Lord Godolphin very politely refused the present, alleging that it would be entirely inconsistent with his dignity and station, to accept of so very valuable a present, (which must have cost an immense sum to procure,) from an entire stranger.

His Lordship, after a minute inspection of the horse, pronounced him to be the very finest and best looking Arabian horse, he ever saw, or had been brought into England, and if Col. Coke, as he styled himself, at at that time, would part with the horse, he would give him a blank check upon the Bank of England, which he, Coke, might fill up with any sum he pleased.

Col. Coke told his Lordship that he never would sell the horse—alleging, at the same time, that he, with great difficulty, labor, and expense, and after travelling in Arabia upwards of three years, procured the horse for the express purpose of presenting to his Lordship, on his arrival in England—he further said, that if his Lordship would not accept him, he would not part with him to any other person. Lord Godolphin was inexorable.

Col. Coke solicited his Lordship again and again, without success, until Coke's entreaties, after a very considerable time, became so very urgent, that at length Lord Godolphin accepted of this very Arabian as the greatest present of the animal creation in the world.

After his Lordship had presented his compliments to Coke, he told him if he could in any way whatever serve him, he would do it with a great deal of pleasure.

About this time, by means (it was supposed) of the servants of Col. C.'s relations hearing his name frequently mentioned in their respective families, and no doubt with a view of receiving a reward of "150 guineas," which government had formerly offered for his apprehension, they lodged information against him, and he was arrested for his former offences, and committed to prison: he wrote to Lord Godolphin, (discovering to him who he was, and his real name) to intercede in his behalf with his majesty, who ordered a writ of "nolle prosequi" to be

issued, saying that Col. C. was an innocent man, and could not be the same person who committed the felonious acts, for which he fled from England.

Colonel Coke was immediately restored to his former rank, and his family.

It will be perceived that if the foregoing account were true, this celebrated horse could not be a Barb. It seems probable, therefore, from the testimony of others, that the above writer labored under some mistake, for we find it asserted by high authority, (American Farmer, Vol. VIII. p. 215) that he was in reality a Barb—a horse of the desert. His color was entire brown bay, with mottles on the buttocks and chest, except a small streak of white upon the hinder heels. He was imported into France from some capital or royal stud in Barbary, whence it was suspected he was stolen, and said to have been foaled in 1724. So little was he valued in France, that he was actually employed in the drudgery of drawing a cart in the streets of Paris. Mr. Coke brought him over from France, and gave him to Williams, Master of St. James' Coffee House, who presented him to the Earl of Godolphin.

From still higher authority, (Library of Useful Knowledge, Farmer's Series, No. II, p. 48,) we learn that he was picked up in France, where he was actually employed in drawing a cart, and when he was afterwards presented to Lord Godolphin, he was in that nobleman's stud a considerable time before his value was discovered. It was not until the birth of Lath, one of the first horses of that period, that his excellence began to be appreciated. He was then styled an Arabian, and was in higher estimation than even the Darley, the founder of the modern thorough bred horses. He died in 1753, at the age of 29.

To this account, it is added, that an intimate friendship subsisted between him and a cat, which either sat on his back when he was in the stable, or nestled as closely to him as she could. At his death the cat refused her food—pined away and soon died. Mr. Holcroft gives a similar relation of the attachment between a race horse and a cat, which the courser would take in his mouth and place in his manger and upon his back, without hurting her.

The DONGOLA HORSE. The kingdom of Dongola and the neighboring districts of Egypt, and Abyssinia, contain a horse not at all like any other oriental.

The Dongola horses stand full sixteen hands high, but the length of the body, from the shoulders to the quarter, is considerably less. Their form, therefore, is opposite to that of the Arabian or English thoroughbred, which are longer by some inches than they are high. The neck is long and slender, the crest fine, and the withers sharp and high, giving a beautiful fore-hand; but the breast is too narrow, the quarters and flanks too flat, and the back *carped.* They constitute excellent war horses, from their speed, durability, and size. Several of them have been lately imported into Europe, but they are little valued.

The ARABIAN. Going farther eastward, we arrive at Arabia, whose horses deservedly occupy the very highest rank.

There are said to be three breeds or varieties of Arabian horses:—the *Altecki*, or inferior breed, on which they set little value, and which

are found wild on some parts of the deserts; the *Kadischi*, literally horses of an unknown race, answering to our half breed horses—a mixed breed; and the *Kotchlani* horses whose genealogy, according to the Arab account, is known for two thousand years.

The Arabian horse would not be acknowledged by every judge to possess a perfect form; his head, however, is inimitable. The broadness and squareness of the forehead, the shortness and firmness of the muzzle, the prominency and brilliancy of the eye, the smallness of the ears, and the beautiful course of the veins, will always characterise the head of the Arabian horse.

His body may be considered as too light, and his chest as too narrow; but behind the arms, the barrel generally swells out, and leaves sufficient room for the play of the lungs.

In the formation of the shoulder, next to that of the head, the Arab is superior to any other breed. The withers are high, and the shoulder blade inclined backward, and so nicely adjusted, that in descending a hill, the point or edge of the ham never ruffles the skin. He may not be thought sufficiently high; he seldom stands more than fourteen hands and two inches.

The fineness of his legs, and the oblique position of his pasterns, may be supposed to lessen his apparent strength; but the leg, although small, is flat and wiry; anatomists know that the bone has no common density, and the starting muscle of the fore arm and the thigh indicate that he is fully capable of accomplishing many other feats, which are recorded of him.

The Barb alone excels him in noble and spirited action; and if there be defects about him, he is perfect for that for which he was designed. He presents the true combination of speed and bottom—strength enough to carry more than a light weight, and courage that would cause him to die rather than give up.

Several interesting anecdotes are related of the Arabian. A few of these may not be unacceptable to our readers. When the Arab falls from his mare, observes a writer, and is unable to rise, she will immediately stand still, and neigh, until assistance arrives. If he lies down to sleep, as fatigue sometimes compels him, in the midst of the desert, she stands watchful over him, and neighs and rouses him if either man or beast approaches. An old Arab had a valuable mare, that had carried him for fifteen years in many a hard fought battle, and in many a rapid, weary march; at length, eighty years old, and unable longer to ride her, he gave her, and a scimitar that had been his father's to his eldest son, and told him to appreciate their value, and never lie down to rest until he had rubbed them both as bright as a looking glass. In the first skirmish in which the young man was engaged, he was killed, and the mare fell into the hands of the enemy. When the news reached the old man, he exclaimed "that life was no longer worth preserving, for he had lost both his son and his mare, and he grieved for one as much as the other;" and he immediately sickened and died.*

The following anecdote of the attachment of an Arab to his mare has often been told, but it comes home to the bosom of every one possessed

* Smith on Breeding, p. 80.

of common feeling. "The whole stock of an Arab of the desert consisted of a mare. The French consul offered to purchase her in order to send her to his sovereign, Louis XIV. The Arab would have rejected the proposal at once with indignation and scorn; but he was miserably poor. He had no means of supplying his most urgent wants, or procuring the barest necessaries of life. Still he hesitated; he had scarcely a rag to cover him—and his wife and his children were starving. The sum offered was great,—it would provide him and his family with food for life. At length, and reluctantly, he consented. He brought the mare to the dwelling of the consul,—he dismounted,—he stood leaning upon her; he looked now at the gold, and then at his favorite; he sighed, he wept. 'To whom is it,' said he, 'I am going to yield thee up? To Europeans, who will tie thee close,—who will beat thee,—who will render thee miserable. Return with me, my beauty, my jewel, and rejoice the hearts of my children.' As he pronounced the last words, he sprung upon her back, and was out of sight in a moment."

The next anecdote is scarcely less touching, and not so well known. Ibrahim, a poor but worthy Arab, unable to pay a sum of money which he owed, was compelled to allow a merchant of Rama to become partner with him in a valuable mare. When the time came, he could not redeem his pledge to this man, and the mare was sold. Her pedigree could be traced on the side of sire and dam for full five hundred years. The price was three hundred pounds; an enormous sum in that country. Ibrahim went frequently to Rama to inquire after the mare; he would embrace her,—wipe her eyes with his handkerchief,—rub her with his shirt sleeves, and give her a thousand benedictions during whole hours that he remained talking to her. 'My eyes!' would he say to her, 'my soul! my heart! must I be so unfortunate as to have thee sold to so many masters, and not keep thee myself? I am poor, my antelope! I brought thee up in my dwelling as my child. I did never beat nor chide thee; I caressed thee in the proudest manner. God preserve thee, my beloved! thou art beautiful, thou art sweet, thou art lovely! God defend thee from envious eyes!"

Sir John Malcolm gives two anecdotes to the same purpose, but of a more amusing nature.

"When the envoy, returning from his former mission, was encamped near Bagdad, an Arab rode a bright bay mare of extraordinary shape and beauty before his tent until he attracted his attention. On being asked if he would sell her,—'What will you give me?' was the reply: 'That depends upon her age; I suppose she is past five?' 'Guess again,' said he. 'Four?' 'Look at her mouth,' said the Arab with a smile. On examination she was found to be rising three. This, from her size and symmetry, greatly enhanced her value. The envoy said, 'I will give you fifty tomans,' (a coin nearly of the value of a pound sterling). 'A little more, if you please,' said the fellow, apparently entertained. 'Eighty. A hundred.' He shook his head and smiled. The offer at last came to two hundred tomans! 'Well,' said the Arab, 'you need not tempt me further; it is of no use.' You are a rich elchee (nobleman.) You have fine horses, camels, and mules, and I am told, you have loads of silver and gold. 'Now, added he, 'you want my mare, but you shall not have her for all you have got.'*

* Malcom's Sketches of Persia, Vol. I. p. 41.

HORSES.

The East Indian Horse. The horses of the East Indies are the *Toorky*, which is said to be beautiful in form, graceful in action, and docile in temper; the *Iranee*, well limbed, but ears large and loose, and deficient in spirit; the *Covakee*, patient and docile, but with an unsightly head; hardy, and calculated for long journies and severe service; the *Mojinniss*, spirited, beautiful, fleet, and persevering, and the *Tazsee*, hollow backed, and therefore deficient in strength, irritable in temper; yet sought after on account of the peculiar easiness of his pace. A general remark applies to all the native horses throughout India, that they want bone below the knee.

The Chinese Horse. This breed is small, weak, ill formed, without spirit, and altogether undeserving of notice.

The Persian Horse is next in estimation, and deservedly so, to the Arabian. The head is almost equally beautiful, the crupper superior; he is equal in speed, but far inferior in endurance. The whole frame is more developed than in the Arabian. They never exceed, it is said, fourteen hands, or fourteen hands and a half high, yet certainly, in the whole, are taller than the Arabs.

The Toorkoman Horse. Turkistan is that part of South Tartary, northeast of the Caspian Sea, and has been celebrated from very early times, for producing a pure and valuable breed of horses. They are called *Toorkomans;* are said to be preferable even to the pure Persians for service. They are large, standing from fifteen to sixteen hands high; swift and inexhaustible under fatigue. Some of them have travelled nine hundred miles in eleven successive days. They however are somewhat too small in the barrel,—too long on the legs,—occasionally ewe-necked, and always have a head out of proportion large; yet, such are the good qualities of the horse, that one of pure blood is worth two or three hundred pounds, even in that country.

The Tartar and Kalmuck Horse. The horses of the other parts of Tartary, comprehending the immense plains of Central Asia, and a considerable part of European Russia, are little removed from a wild state; they are small and badly made; but capable of supporting the longest and most rapid journey, on the scantiest fare.

The Turkish Horse. The Turkish horses are descended principally from the Arab, crossed by the Persian and certain other bloods. The body however is even longer than the Arabian's, and the crupper more elevated. They have contributed materially to the improvement of the English breed.

There is no creature so gentle as a Turkish horse, or more respectful to his master, or the groom that dresses him. The reason is, because they treat their horses with great lenity. This makes their horses great lovers of mankind; and they are so far from kicking, wincing, or growing untractable by this gentle usage, that you will hardly find a masterless horse among them.

The German Horses are generally large, heavy, and slow. The Hungarian may be an exception, being lighter, speedier, and giving greater proof of Eastern blood. Every part of the continent, however, following the example of England, has been diligently engaged in the improvement of its breed, and the German and Prussian horses are now better proportioned and have considerable endurance, but are still defi-

cient in speed. The Prussian, German, and the greater part of the French cavalry are procured from Holstein. They are of a dark, glossy bay color, with small heads, large nostrils, and full dark eyes, the fire and clearness of which seem to denote the inward spirit of the animal. They are beautiful, active, and strong.

The SWEDISH, FINLAND, and NORWEGIAN HORSE. Of the Swedish horses, Clarke, in his "Scandinavia," says, that they are small, but beautiful, and remarkable for their speed and spirit. Those of Finland, he describes as yet smaller, not more than twelve hands high, beautifully formed, and very fleet. The peasants take them from the forests when they are wanted for travellers. Although apparently wild, they are under perfect control, and they trot along with ease, at the rate of twelve miles an hour.

The following story is told of one of the Norwegian horses. His master had been dining at a neighboring town, and when it was time to return, had exceeded so much, that he could not keep a firm seat in his saddle. The horse regulated himself as well as he could, according to the unsettled motion of his rider, but, happening to make a false step, the peasant was thrown, and hung with one foot entangled in the stirrup. The horse immediately stopped, and, twisting his body in various directions, endeavored to extricate his master, but in vain. The man was severely hurt, and almost helpless; but the shock had brought him to his senses. The horse looked at him as he lay on the ground, and stooping, laid hold of the brim of his hat, and raised his head a little; but the hat coming off, he fell again. The animal then laid hold of the collar of his coat, and raised him by it so far from the ground that he was enabled to draw his foot out of the stirrup. After resting awhile, he regained the saddle, and reached his home. Grateful to his preserver, the man did what every good feeling bid him—he cherished the animal until it died of old age.

The ICELAND HORSE is small, strong, and swift. The island abounds in troops of horses, which live upon the mountains, where they obtain only a scanty living. A few are usually kept in the stable, but when the peasant wants more, he catches as many as he needs, and shoes them himself, and that sometimes with a sheep's horn.

The FLEMISH and DUTCH HORSES are large, and strongly and beautifully formed. The English are indebted to them for some of the best blood of their draught horses.

The FRENCH HORSE. France contains, like England, numerous breeds of horses, and considerable attention has lately been paid to their improvement; but they are far inferior, it is said, to the English, in beauty, fleetness, and strength. The provinces of Auvergne and Poitou produce good ponies and galloways; but the best French horses are bred in Limousin and Normandy.

The SPANISH HORSE. Spain was early celebrated for her breed of horses. The Andalusian charger and the Spanish jennet are familiar to all readers of romance. The subjugation of so great a portion of the peninsula to the Moorish sway, by introducing so much of the Barbary blood, mainly contributed to the undisputed excellence of the Spanish horse. One breed, long in the limbs, and graceful in all its motions, was the favorite war horse of the knight; while another race, carrying the

esquire, although inferior in elegance, possessed far more strength and endurance. The Spanish horse of the present day is not much unlike the Yorkshire half-breed; perhaps with flatter legs and better feet, but far inferior figure.

The ITALIAN HORSES were once in high repute, particularly the Neapolitans; but like every thing else in those mismanaged countries, they ha.. sadly degenerated. One circumstance has mainly contributed to this falling off in reputation and value, viz. that the breed has been kept up by occasional intermixture, not of Eastern, but of European blood. A few of the Neapolitan horses, from their superior size and stateliness, are well adapted for the carriage.

The ENGLISH HORSE. The earliest record of the horse in Great Britain, is contained in the history given by Julius Cæsar of his invasion of that island. The British army was accompanied by numerous war chariots, drawn by horses. What kind of horse the Britons then possessed, it would be useless to enquire; but from the cumbrous structure of the car, and the fury with which it was driven, they must have been both active and powerful. By the introduction of the Roman cavalry, the English horse received its first cross. Several centuries passed by, and we have no record of the value or character, improvement or deterioration of the animal.

Soon after the time of Alfred the Great, some attention appears to have been paid to the improvement of the horse, by Athelston, his son, and the second in succession to him. This was about the year 930. In A. D. 1000, it was decreed, and from this decree something may be gathered of the relative value of the horse, that if a horse were destroyed or negligently lost, the compensation should be at thirty shillings; a mare or colt, twenty shillings; a mule or young ass, twelve shillings; an ox, thirty pence; a cow, twenty-four pence; a pig, eight pence: and it strangely follows, a man, one pound.

About this time, or a little before, laws were passed, which fixed the value of a foal, not fourteen days old, at fourpence; at one year and a day, it is estimated at forty-eight pence, and three years, sixty pence. It was then to be tamed with the bridle, and brought up either as a *palfrey* or a *serving horse;* when its value became one hundred and twenty pence; and that of a wild unbroken mare, sixty pence.

In those days, the buyer was allowed time to ascertain whether the horse was free from three diseases. He had three nights to prove him for the staggers; three months to prove the soundness of his lungs; and one year to ascertain whether he was infected with the glanders. For every blemish discovered after the purchase, one third of the money was to be returned, except it should be a blemish of the ears or tail.

It was also decreed, "whosoever shall borrow a horse, and rub the hair so as to gall the back, shall pay four pence; if the skin is forced into the flesh, eight pence; if the skin be forced to the bone, sixteen pence."

With William the Conqueror, about A. D. 1050, came a marked improvement in the British horse. In the reign of Henry I., A. D. 1121, the first Arabian horse, or at least the first on record, was introduced. Forty years afterwards, Smithfield was celebrated as a horse market.

From this time, until Henry VIII., the English horse advanced, but it was by slow degrees.

In the time of this last monarch, an English treatise on the management of horses and cattle, was written by Sir A. Fitzherbert, Judge of the Common Pleas, and was the first of the kind produced. The learned Judge shared the common fate of those who have to do with the horse. He thus writes: "Thou grasyer, thou mayest fortune to be myne opinion or condytion to love horses, and young coltes and foles to go among thy cattle; take heed that thou be not beguiled as I have been an hundred tymes and more. And first, thou shalt know that a good h[illegible] has 54 properties; viz. 2 of a man, 2 of a badger, 4 of a[illegible] ox, 9 of a hare, 9 of a fox, 9 of an asse, and 10 o[illegible] writers have pirated from Sir A., but have not [illegible] following description of the horse is [illegible] should have three qualities of a [illegible] and a long mane—three of a lio[illegible] of a bullock; the eye, the n[illegible] gentleness, and patience [illegible] —three of a deer; [illegible] neck, and hear[illegible] pent; mem[illegible] walki[illegible]

ENGLISH HORSE.

Turk, and his name, and that of his keeper, will long be remembered. Shortly afterwards appeared the Hemsley Turk, introduced by Villiers, the first Duke of Buckingham. He was followed by Fairfax's Morocco barb. These horses speedily effected a considerable change in the character of the English breed, so that Lord Harleigh, one of the old school, complained that the great horse was fast disappearing, and that horses were now bred light and fine, for the sake of speed only.

At the Restoration, a new impulse was given to the cultivation of the
by the inclination of the court to patronize gayety and dissipation.
Newmarket were restored, and as an additional spur to
were now given at each of the principal courses.
of the horse to the Levant to purchase brood
principally Barbs and Turks.

century, the system of improve-
of Eastern blood was *occa-*
eriority of the engrafted,
to be evident. Still
ssibly be increas-
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## THE ROAD HORSE.

The present road horse is said to be a much superior animal to the portrait here given. In describing a good road horse, the Editors of the Library of Useful Knowledge dwell with much emphasis upon the importance of the manner in which he brings down his feet to the ground. He should not, indeed, carry his legs too high, say they, but the main question is, does he dig his toe into the ground; if the shoe, after having been on a week or fortnight, is not unnecessarily worn at the toe, and you feel him put his feet flat on the ground, do not scruple to buy him, nay, esteem him a "choice gifted hackney."

Every horse, however, is liable to fall, and therefore comes the golden rule of riding, "*never trust to your horse.*" *Always feel his mouth lightly.* You will thus be able to give the animal assistance *immediately*, before he is too much off his centre, and when a little check will save him. By this constant gentle *feeling*, you will likewise induce him to carry his head well, than which, few things are more conducive to the beautiful, safe, and easy going of a horse.

The hackney should be a hunter in miniature, with these exceptions. His height should rarely exceed fifteen hands and an inch. He will be sufficiently strong and more pleasant for general work, below that standard. He should be of a more compact form than the hunter; more bulk according to his height, for he has not merely to stand an occasional, although severe burst, but a great deal of every day work.

It is of essential consequence that the bones beneath the knee should be deep and flat, and the tendon not *tied in.*

The pastern should be short, and although oblique or slanting, yet far less so than that of the race horse, and considerably less than that of the hunter. There should be obliquity enough to give pleasant action, but not enough to render the horse incapable of the wear and tear of constant, and sometimes hard work.

The foot is a matter of the greatest consequence in a hackney. It should be of a size corresponding with the bulk of the animal, neither too hollow, nor too flat; open at the heels; and free from corns and thrushes.

The fore legs should be perfectly straight. There needs not a moment's consideration to be assured that a horse, with his knees bent, will, from a slight cause, and especially if he be over weighted, come down.

The back should be straight and short; yet sufficiently long to leave comfortable room for the saddle between the shoulders and the *huck*, without pressing on either. Some persons prefer a hollow backed horse. It is generally an easy one to go. It will canter well with a lady; but it will not carry a heavy weight, or stand much hard work.

The road horse should be high in the forehead, round in the barrel, and deep in the chest; the saddle will not press them too forward, but the girths will remain, *without crupper*, firmly fixed in their proper place.

The points of shape essential to be attended to in the choice of a hackney, are—the shoulders, and the fore legs and feet: because a horse whose shoulders are properly formed and placed, is not liable to fall down; and because his soundness depends chiefly upon his legs and feet

The shoulders should not be too upright, but should slope backwards from the shoulder points to the withers. It is desirable, if the horse is intended to carry a man of much weight, that the shoulders should be rather thick than thin; but it is essential that they should not be too large at the points. A horse whose shoulders are good, stands, when in his natural position, with his fore legs in a line perpendicular to the ground; it is therefore very desirable that the purchaser should see him in the stable, and before he has been moved; for he will then find him in his natural position, in which it may be difficult to place him, after he has been once disturbed. Another mode of ascertaining whether the shoulders are properly placed, is by allowing the horse to walk past you, and to observe whether he places his fore foot more forward than the shoulder point when he puts it on the ground. A horse whose shoulders are properly formed, will always do so; one whose shoulders are upright, cannot. The fore quarters of a horse intended to be used as a hackney, constitute an essential point; his carcass should be round, and his ribs deep. A horse's fore leg, of the proper form, should be flat, and as large under the knee as it is just above the fetlock. The pastern should be so joined to the leg at the fetlock, that the horse should neither turn his feet out or in; but it is less objectionable that a horse should turn his feet a little outwards, provided it is not so much as to make him hit his fetlocks, than that he should turn them inwards.

The FARMER'S HORSE is an animal of *all work*; to be ridden occasionally to market or for pleasure, but to be principally employed for draught. He should be higher than the road horse; about fifteen hands and two inches may be taken as the best standard. A horse with a shoulder thicker, lower, or less slanting than would be chosen in a hackney, will better suit the collar; and collar work will be chiefly required of him. A stout compact horse should be selected, yet not a heavy cloddy one. Some blood would be desirable, but the half bred horse will generally best suit the farmer's purpose. He should have weight enough to throw into the collar, and sufficient activity to get over the ground.

The COACH HORSE. This animal has fully shared in the progress of improvement, and is as different from what he was fifty years ago, as is possible to conceive. The clumsy barrelled, cloddy shouldered, round legged, black family horse, neither a coach nor a dray horse, but something between both, as fat as an ox, and, with all his pride and prancing at first starting, not equal to more than six miles an hour, and knocking up with one hard day's work, is no more seen: and we have, instead of him, an animal as tall, deep chested, rising in the withers, slanting in the shoulders, flat in the legs, with even more strength, and with treble the speed.

There is a great deal of deception, however, even in the best of these improved coach horses. They prance it nobly through the streets; and they have more work in them than the old clumsy sluggish breed; but they have not the endurance that could be wished,—and a pair of poor post horses would, at the second day, beat them hollow.

The knee-action, and high lifting of the feet in the carriage horse, is deemed an excellence, because it adds to the grandeur of his appearance; but, as has already been stated, it is necessarily accompanied

FLYING CHILDERS.

He was first trained as a hunter, but the superior speed and cour-
;e which he discovered, caused him to be soon transferred to the turf.
ɔmmon report affirms that he could run a mile in a minute, but there
no authentic record of this. Childers ran over the round course at
ɛwmarket (three miles six furlongs and ninety three yards,) in six
inutes and forty seconds; and the Bacon course, (four miles, one fur-
ıg and one hundred and thirty-eight yards,) in seven minutes and thir-
seconds.

ECLIPSE.

Eclipse was got by Mask, a grandson of Bartlett's Childers. Of the
auty, yet peculiarity of his form, much has been said. The very great

size, obliquity, and lowness of his shoulders were the objects of general remark—with the shortness of his fore-quarters; his ample and finely proportioned quarters, and the swelling muscles of his fore arm and thigh. Of his speed, no correct estimate can be formed, for he never met with an opponent sufficiently fleet to put it to the test.

He was bred by the Duke of Cumberland, and sold at his death to Mr. Wildman, a sheep-salesman, for seventy-five guineas. Col. O'Kelly purchased a share of him from Wildman. In the spring of the following year, when the reputation of this wonderful animal was at its height, O'Kelly wished to become the sole owner of him, and bought the remaining share for one thousand pounds.

Eclipse was what was termed a thick winded horse, and puffed and roared so as to be heard at a considerable distance. For this, or some other cause, he was not brought on the turf, until he was five years old.

O'Kelly, aware of his horse's powers, had backed him freely on his first race in May, 1769. This excited curiosity, or perhaps, roused suspicion, and some persons attempted to watch one of his trials. Mr. John Lawrence says that they "were a little too late," but they found an old woman who gave them all the information they wanted. On enquiring whether she had seen a race, she replied, "that she could not tell whether it was a race or not; but that she had just seen a horse with white legs, running away at a monstrous rate, and another horse a great way behind him, trying to run after him; but she was sure he would never catch the white legged horse, if he ran to the world's end."

The first heat was easily won, when O'Kelly, observing that the rider had been pulling at Eclipse during the whole race, offered a wager that he would distance the horses in the next heat. This seemed a thing so highly improbable, that he immediately had bets to a large amount. Being called on to declare, he replied, "Eclipse first, and the rest nowhere!" The event justified his prediction; all the others were distanced by Eclipse with the greatest ease, or in the language of the turf, they had no place.

In the spring of the following year, he beat Mr. Bentworth's Bucephalus, who had never before been conquered. Two days afterwards he distanced Mr. Strode's Pensioner, a very good horse; and in August of the same year he won the greatest subscription at York. No horse daring to enter against him, he closed his short career of seventeen months, by walking over the Newmarket course for the King's plate, on October the 18th, 1770. He was never beaten, nor ever paid forfeit and won for his owner more than twenty-five thousand pounds.

Wellesley Arabian. This is the very picture of a beautiful wild horse of the desert; his precise country was never determined, although it is known that he is a horse of foreign extraction. He is evidently neither a perfect Barb, nor a perfect Arabian, but from a neighboring province, where both the Barb and the Arabian would expand a more perfect fulness of form. This horse has been erroneously selected as the pattern of a superior Arabian, and therefore we have introduced him; few, however, of his produce were trained who can add much to his reputation.

It has been imagined that the breed of racing horses has lately very considerably degenerated. This is not the case. Thorough-bred horses

f the country, straps a saddle on his back, and bestriding him, removes ae poncho ; upon which the astonished horse springs on his legs, and ndeavors, by a thousand vain efforts, to disencumber himself of his new naster, who sits quite composedly on his back, and by a discipline which ever fails, reduces the horse to such complete obedience, that he is soon rained to lend his whole speed and strength to the capture of his companions.

*Canadian Horse.* This horse is found principally in Canada and the orthern states. He is supposed to be of French descent, and many of ae celebrated American trotters are of this breed. This species of horse s generally small, but remarkably compact. He will keep in good conition, and even grow fat, on indifferent fare.

*Conestoga Horse.* This horse is found in Pennsylvania and the midle states. He is generally long in the leg, and light in the carcass—ometimes rising seventeen hands, used principally for the carriage : but vhen not too high, and of sufficient substance, useful for hunting and he saddle.

*English Horse in the United States.* The horses generally found in he United States, are the descendants of English importation. Until vithin a few years, little attention has been paid to the raising of first ate horses. This is particularly true of New England. A deeper inerest, however, is beginning to be felt on this important subject, and nany valuable horses are to be found in all parts of the country. More ttention has for years been paid to the rearing of good horses in Virinia, Kentucky, and other southern states. Importations of the best English blood have at different times been made, which has been diliently and purely preserved.

AMERICAN ECLIPSE.

Our limits forbid even the mention of the names of distinguished horses which from time to time have been imported into the country, and to vhich we are indebted for the finest horses of the present day. Nor

shall we attempt an enumeration of the valuable horses which have been bred in our own country; but content ourselves with presenting to our readers the preceding portrait of the celebrated American Eclipse, named after his English ancestor Eclipse, when only five months old, from the promise which he then gave of peculiar strength and speed.

This was a sorrel horse, with a star, and the near hind foot white, fifteen hands three inches high, possessing a large share of bone and muscle, and excelling all horses of his day in the three great essentials of speed, stoutness, and ability to carry weight. He was foaled in the year 1814. His pedigree is traced through the celebrated English horse Messenger, Eclipse; up to the distinguished Godolphin Arabian, of which we have given a particular account in a previous page.


BELLFOUNDER.

This celebrated horse, is a bright bay, with black legs, standing 15 hands high; his superior blood, symmetry, and action excel those of every other trotting stallion. He is allowed by the best judges in Norfolk, (Eng.) to be the fastest and best bred horse ever sent out of that country.

### CRITERIA, AGE, &C. OF HORSES.

The general criteria of the qualities of the horse, (observes Loudon,) are derived from inspection and trial. His outward appearance among judges, affords a pretty just criterion of his powers, and a moderate trial usually enables the same judgment to decide on the disposition to exercise such powers.

Color, as a criterion of mental and personal qualities, is laid much stress on by many persons; and notwithstanding the adage, that "a good horse cannot be of a bad color," long experience has shown that, in

general cases, certain tints are usually accompanied by certain qualities of person or disposition. As a general rule, dark colored horses are certainly the best; but black, as the darkest of all, seems to form an exception to this rule. Light shades appear unfavorable to strength and durability; they are also accompanied frequently with irritability, and perverseness of temper. Something like a general law in the animal economy seems to prevail to make white a distinctive mark of weakness. Age, which is the parent of weakness, brings with it white hairs, both in man and in horses, and most other quadrupeds. The hair formed, after a wound has robbed a part of its original covering, is often white, because the new formed surface is yet in a state of debility. It is likewise a fact, well known among the observant, that the legs and feet when white, are more obnoxious to disease, than those of a darker tone. The Arabs remark, that light chestnut horses, have soft tender feet. It is the observance of these peculiarities, that has, at length, guided our taste and formed our judgment of beauty. With the English, much white on the legs is considered as a deformity, and expressively called *foul marked;* whereas pied markings in other parts are reckoned beautiful. In Africa, however, Capt. Lyon informs us, a superstitious dependence is placed on horses with legs and feet stockined with white. It does not appear that climate has the same influence on the color of horses, as on other domesticated animals. In all latitudes in which the horse can live, he is black or white, indiscriminately; but as he cannot endure extreme rigor, it is not necessary he should vary.

The *criteria of action* are derived from a due consideration of the form generally, and of the limbs particularly; as well as from seeing the horse perform his paces in hand.

The *criteria of hardihood* are derived from the form of the carcass; which should be circular or barrelled; by which food is retained and strength gained to perform what is required. Such horses are also generally good feeders.

The *criteria of spirit, vigor*, or mettle, as it is termed, are best derived from trial. It should always be kept in mind, that a hot fiery horse is as objectionable, as a horse of good courage is desirable. Hot horses may be known by their disinclination to stand still; by their mettle being raised by the slightest exercise, especially when in company. Such horses seldom last long, and under accident are impetuous and frightened in the extreme. A good couraged horse, on the contrary, moves with readiness as well alone as in company; he carries one ear forward and one backward; is attentive and cheerful, loves to be talked to, and caressed, even while on his journey; and if in double harness, will play with his mate. Good couraged horses are always the best tempered, and, under difficulties, are by far the most quiet, and least disposed to do mischief.

The *criteria of a horse peculiarly adapted to the labors of agriculture*, are thus given by Culley. "His head should be small as the proportion of the animal will admit; his nostrils expanded, and muzzle fine; his eyes cheerful and prominent; his ears small, upright, and placed near together; his neck, rising out from between his shoulders with an easy tapering curve, must join gracefully to the head; his shoulders being well thrown back, must also go into his neck (at what is called the points) unperceived, which perhaps facilitates the going much more than the nar-

row shoulder; the arm, or fore thigh should be muscular, and tapering from the shoulder, to meet a fine, straight, sinewy, and boney leg; the hoof circular, and wide at the heel; his chest deep, and full at the girth; his loins or fillets broad and straight, and body round; his hips or hooks by no means wide, but quarters long, and the tail set on so as to be nearly in the same right line as his back; his thighs strong and muscular; his legs clean and fine boned; the leg bones not round, but what is called *lathy* or flat."

The criteria, relative to the age and the essential characteristics of a good horse, may not improperly form a part of the present outline. In old horses, the eye pits are generally deep; though this mark is very uncertain, as it also occurs in young horses that are descended from aged stallions. But the most certain criterion is that derived from the teeth, the number of which amounts to forty; namely, twenty-four grinders, or double teeth, (which in fact afford no certain guide,) and sixteen others, viz. four tushes or tusks, and twelve fore teeth: these last are the surest guides for discovering the age of a horse. As mares usually have no tusks, their teeth are only thirty-six. A colt is foaled without teeth; in a few days he puts out four, which are called pincers, or nippers; soon after appear the four separaters, next to the pincers; it is sometimes three or four months before the next, called corner teeth, push forth. These twelve colt's teeth, in the front of the mouth, continue without alteration, till the colt is two years or two years and a half old, which makes it difficult, without great care, to avoid being imposed on during that interval, if the seller find it his interest to make the colt pass for either younger or older than he really is; the only rule you have then to judge by is his coat, and the hairs of his mane and tail. A colt of one year has a supple, rough coat, resembling that of a water spaniel, and the hair of his mane and tail feels like flax, and hangs like a rope untwisted; whereas a colt of two years has a flat coat, and straight ears like a grown horse.

At about two years and a half old, sometimes sooner, sometimes later according as he has been fed, a horse begins to change his teeth. The pincers which come the first, are also the first that fall; so that at three years he has four horse's and eight colt's teeth, which are easily known apart, the former being larger, flatter, and yellower than the other, and streaked from the end quite into the gums.

These four horse pincers have in the middle of their extremities, a black hole, very deep; whereas those of the colt are round and white. When the horse is coming four years old, he loses his four separaters, or middle teeth, and puts forth four others, which follow the same rule as the pincers. He has now eight horse's teeth and four colt's. At five years old he sheds the fore corner, which are his last colt's teeth, and is called a horse.

During this year also, his four tusks (which are chiefly peculiar to horses) come behind the others; the lower ones often four months before the upper; but whatever may be the common opinion, a horse that has the two lower tusks, if he has not the upper, may be judged to be under five years old, unless the other teeth show the contrary; for some horses that live to be very old never have any tusks at all. The two lower tusks are one of the most certain rules that a horse is coming five years old, notwithstanding his colt's teeth may not be all gone.

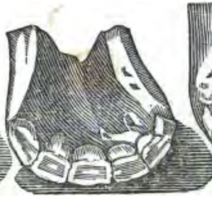
## CRITERIA, AGE, &C. OF HORSES.

It is not an unfrequent practice of jockies and breeders, in order to make their colts seem five years old, when they are but four, to pull out their last colt's teeth; but if all the colt's teeth be gone, and no tusks appear, the purchaser may be certain this trick has been played; another artifice they use is to beat the bars every day with a wooden mallet, in the place where the tusks are to appear, in order to make them seem hard, as if the tusks were just ready to cut.

Figure 1 of the annexed engravings of the horse's teeth represents them at 2 years and a half old; fig. 2, at 3 years old; fig. 3, at 4 years; fig. 4, at five years; and fig. 5, at 6 years.

*No.* 1.

*No.* 2.



*No.* 3.

*No.* 4.

*No.* 5.

When a horse is coming six years old, the two lower pincers fill up, and instead of the holes above mentioned, show only a black spot. Betwixt six and seven, the two middle teeth fill up in the same manner: and between seven and eight the corner teeth do the like; after which it is said to be impossible to know certainly the age of a horse, he having no longer any mark in his mouth. In this case recourse can only be had to the tusks, and the situation of the teeth.

With respect to the tusks, the purchaser must with his finger feel the inside of them from the point quite to the gum. If the tusk be pointed flat, and have two little channels within side, he may be certain the horse is not old, and at the utmost only coming ten. Between eleven and twelve, the two channels are reduced to one, which after twelve entirely disappears, and the tusks are as round within as they are without; he has no guide then but the situation of the teeth. The longest teeth are not always a sign of the greatest age, but their hanging over and pushing forward, as also their meeting perpendicularly, is a certain token of youth.

Many persons, whilst they see certain little holes in the middle of the teeth imagine that such horses are but in the seventh year, without regard to the situation the teeth take as they grow old.

When horses are young, their teeth meet perpendicularly, but grow longer, and push forward with age; besides the mouth of a young horse is very fleshy within, in the palate, and his lips are firm and hard: on the contrary the inside of an old horse's mouth is lean both above and below, and seems to have only the skin upon the bones. The lips are soft and easy to turn up with the hand.

All horses are marked in the same manner, but some naturally and others artificially. The natural mark is called begue; and some ignorant persons imagine such horses are marked all their lives; because for many years they find a little hole, or a kind of void in the middle of the separaters and corner teeth; but when the tusks are grown round, as well within as without, and the teeth point forward, there is room to conjecture, in proportion as they advance from year to year, what the horse's age may be, without regarding the cavity above mentioned.

This artificial manner is made use of by dealers and jockies, who mark their horses after the age of being known, to make them appear only six or seven years old. They do it in this manner: they throw down the horse to have him more at command, and, with a steel graver, like what is used for ivory, hollow the middle teeth a little, and the corner ones somewhat more; then fill the holes with a little rosin, pitch, sulphur, or some grains of wheat, which they burn in with a bit of hot wire made in proportion to the hole. This operation they repeat from time to time, till they give the hole a lasting black, in imitation of nature; but notwithstanding this fraudulent attempt, the hot iron makes a little yellowish circle round the holes, like that which it would leave upon ivory; they have therefore another trick to prevent detection which is to make the horse foam from time to time, after having rubbed his mouth, lips and gums with salt, and crumbs of bread dried and powdered with salt. This foam hides the circle made by the iron.

Another thing which they cannot accomplish, is to counterfeit young tusks, it being out of their power to make those two cranies above mentioned, which are given by nature; with files they make them shorter or flatter, but then they take away the shining natural enamel, so that one may always know by these tusks, horses that are past seven, till they come to twelve or thirteen. The figures perfixed to these remarks on horse's teeth, will illustrate the preceding hints; being drawn from the eeth themselves, at the various ages therein specified.

With regard to the circumstances indicating a *sound horse*, it may be observed that where a horse is free from blemish, the legs and thighs are well shaped; the knees straight; the skin and shanks thin; the back sinews strong and firm. The pastern joints should be small and taper, and the hock lean, dry, and not puffed up with wind. With respect to the hoof itself, the coronet ought to be thick, without any tumor or swelling; the horn bright, and of a greyish color. The fibres of a strong foot appear very distinctly, running in a direct line from the coronet to the toe, like the grain of wood. Such a foot, however, ought to be kept moist and pliable, as it is subject to fissures and cracks, by which the hoof is sometimes cleft through the whole length of the coro-

net. A narrow heel is likewise a great defect; and, if it do not exceed two fingers in breadth, it forms an imperfect foot. A high heel often causes a horse to trip or stumble: while a low one, with long yielding pasterns is apt to be worn away on a long journey. On the other hand, a foot disproportionately large, renders the animal weak and clumsy in its gait.

The head of a horse ought to be small, and rather lean than fleshy, his ears should be erect, thin, sprightly, and pointed; the neck arched towards the middle, tapering gradually towards the head; the shoulders rather long; the withers thin, and enlarged by degrees as they extend downwards, yet so as to render his breast neither too gross nor too narrow. Such are the principal marks by which the best form and proportion of that useful animal may be determined without reference to the deviations from those general rules which characterize the cart-horse, and which have been already noticed.

NICKING is an operation performed for the purpose of making a horse carry an elegant artificial tail. To such an operation some farmers have a strong objection, on account of the suffering it causes to the animal, and a belief of its injurious effects, especially in relaxing the muscles about the hinder parts. The former objection has more weight than the latter; since those tendons, muscles, nerves, arteries, &c. which are separated in nicking, are always cut in docking, an operation often made, and never to the permanent injury, or weakening of the horse.

Several methods for nicking horses have been adopted by different persons. The following, however, it is believed, has the sanction of the most experienced.*

Having provided a convenient stall, pulleys, halter and manger, you may proceed to secure the horse, by putting a switch on his upper lip, but not so high as to prevent his breathing; next make a cord fast to the fetlock of one of his hind legs, and carry it thence, and fasten it to the fore leg above the knee. Thus confined, the horse can do no injury to the operator and his attendants. The tail of the horse is now to be closely and neatly platted from the root to the end, at which point it should be dubbed and turned over a small stick, and securely tied with a waxed string. Being now provided with a sharp knife, and a crooked iron, or buck's horn, turn the tail up in a direct line with the back bone, and make a transverse incision, immediately across the tail, one and a half inches from the root, and deep enough to separate the tendons on each side of the under part of the tail, which will be found about a quarter of an inch from the hair on the outer edge; the incision in the middle may be shallow. Should the horse bleed beyond two gallons, the flow of blood may be checked by putting him in the pulleys, or by wrapping the tail up moderately tight with a linen rag, from the root to the end. Next, at the distance of two or two and a half inches from the transverse incision, make two longitudinally, about three inches in length, which will expose the large tendons on each side. Make two other incisions of the same kind, commencing about one inch from the second, and in length running within about two inches of the end of the tail. Make a transverse incision within half an inch of the termination of the longitudinal incisions,

* Mason's Farrier, Improved.

pretty deep. With the buck's horn, or crooked iron, take up the large tendons in the second incision, and draw the ends out of the first; take up those in the third, and draw the ends out of the second; and at the upper part of the wound cut off the tendons even and smooth. Now strain up the tail opposite the second incisions, until the bone slips or breaks; serve the tail opposite the third incisions in the same manner; also the fourth and last, which should be made across.

The operation being thus performed, the tail of the horse should be washed in strong salt and water, after which he may be put in a stall or turned to pasture for two or three days.

At the end of this time, wash the wound and tail with strong soap suds, and place the horse in the pulleys, where he should remain about three weeks, or until his wounds have healed. Abstract half a gallon of blood each week; and double that quantity should the tail be much inflamed. Keep the parts clean by frequently washing with soap suds. Twice a week take the tail from the pulleys, and let it remain down during the night. Before putting it up again, the horse may be rode a few hundred yards.

Great pains should be taken to have the weights equal, in order to prevent the tail from permanently twisting, as this would ruin the animal in appearance. During the continuance of the horse in the pulleys, his diet should be light, and if practicable consist of green food. His legs should be frequently washed or bathed with pot liquor, in which bacon has been boiled. Vinegar, sweet oil, or lard and spirits may be substituted. Occasionally the wounds may be washed in copperas water, which will accelerate the process of healing.

PRICKING. The operation, which consists in simply dividing the great tendons of the tail, is now generally abandoned, having seldom been found to accomplish the desired effect.

FOXING. This consists in depriving a horse of a portion of his ears for the purpose of improving his looks. An easy mode of performing the operation is to take a small paint brush, and with paint in contrast to the color of the horse, mark the ears of the length and shape desired; then place a switch on the horse's nose, at the same time holding up a fore foot; with a sharp knife cut the ears in the line made by the paint. Wash the wound with salt and water, once a day, for a week, after which apply sweet oil until healed. Those horses only, which have small, thin, delicate heads, are improved by foxing.

DOCKING. To perform this operation safely, put a switch on the upper lip of the horse, and hold one of his fore legs up well nigh his body. Tie a waxed string tight round the tail above where it is to be cut off. Lay the tail on a smooth block of wood, and with a sharp knife and mallet, you may easily sever it at a single blow. When this has been effected, place a little rosin on the wound, and sear it moderately with a hot iron. In a few days remove the waxed string, and to the wound apply occasionally a little fresh butter or sweet oil.

FATTENING. To fatten a horse in a short space of time, is justly considered a desirable art. Should the animal which you wish to fatten be quite poor, commence by subtracting one quart of blood—to be repeated once in eight or ten days. If he be in tolerable condition, the bleedings may consist of two quarts at a time. Commence also giving, at

him placed on a good bed of straw, then take of spirits of any kind, half a pint, of vinegar half a pint, mix them together, and let his legs be washed with the mixture until they are dry. 8th. Let him be well curried, brushed, and rubbed with straw. 9th. Water him plentifully. 10th. Feed him with two gallons of oats, or one and a half gallons of corn or hominy, and eight or ten bundles of fodder. 11th. Let his hoofs be nicely cleaned out and stuffed with fresh cow manure; this application keeps them tough, moist, and cool. 12th. Change your food as often as possible; carefully avoid eating any that is new, or just gathered. Observe the above rules to your journey's end, except your horse should prove a great feeder, and in that case you may indulge him a little; but the quantity I have heie recommended, is enough for any common horse when travelling. It may not be amiss to remind the young traveller, to inspect his horses' shoes once a day, and whatever appears amiss about them to have immediately rectified. It frequently happens that the skin of young horses unaccustomed to travel, is chaffed and scalded by the friction of the girth; the part, washed and cleaned with a little soap and water, and then washed with a little salt and water, will immediately cure and toughen the skin.

## ON THE REARING AND TRAINING OF COLTS.

During the first summer the foals may be allowed to run with their dams until September or October, if the weather continue open and mild. They should then be weaned and kept in fold yards, or paddocks, containing open sheds, with low racks and mangers for receiving their food; which ought, at first, to be the sweetest hay that can be procured. Where rowen can be commanded, it will furnish a succulent and invigorating article; but, both with hay and rowen, bran or oats should be given in due proportions, which indeed can only be ascertained by experience. When, however, oats form a part of the food, it has been recommended to bruise or crush them previously in a mill; which necessary precaution will prevent the distension of the lower jaw veins, which would otherwise attract the blood and humors down into the eyes, and thus occasion blindness. Further; by feeding young colts with oats, in conjunction with other articles, their limbs become better knit than when they are fed only with bran and hay; while they will also be enabled to endure greater severity of weather, and to acquire the vigor requisite to their future improvement. It may indeed, be assumed as an axiom, that there is no greater error in breeding any animals, than that too common one of stinting them during the early period of their growth. It is then that they require the greatest nourishment; and if it be withheld, they will be injured in their constitution, and consequently in their value, to a far greater extent than any saving that can be effected in their food; but to no animal does this remark apply more strongly than to the horse.

It is a common practice, on *weaning foals*, to put them into warm stables during the following winter; from a notion that they are not, at that early age, able to support the cold of an open shed. Whether this may be judicious with regard to the more tender breeds of blood cattle, it is not our present object to inquire; but with respect to the eart species, it is unquestionably wrong. These, from the nature of their future employment, must necessarily be exposed to every vicissitude of weather;

and they cannot be too early inured to a certain degree of hardship. They should, indeed, be carefully kept from lying out in the wet at night; but during the day, they cannot be too much abroad; and dry hovels are far to be preferred to warm stables for their nightly shelter. It has been even found that young colts, which had shown symptoms of disease while kept with all the care usually bestowed on hunters, have recovered when removed to a paddock, and that weaned foals have thriven better when only sheltered in a rick yard than when housed.

*Colts*, thus treated, will have acquired sufficient strength and hardihood before the second winter, to be enabled to brave the inclemency of the season, without any other food than hay, or any other covering than that with which nature has provided them. The largest dray horses are thus reared in the Lincolnshire marshes, in England: yet if they can be allowed the shelter of a straw yard, with the addition to their hay, of unthrashed oat straw, or some of the succulent roots, but especially carrots, it will be of material benefit; but they should be daily turned out into the field, as exercise is not merely conducive to their general health and growth, but particularly requisite in strengthening the sinews of their limbs, and giving firmness to their feet. This, indeed, is attended with additional trouble; for, in severe seasons, or when the pasture is quite bare, it becomes necessary to feed them in the pasture to which they are turned.

The following summer the colts should be allowed the range of the best pastures, though they are too frequently turned into the worst; and in autumn they should be taken in, for the purpose of being broke to labor.

The *process of training* horses for the saddle is one of considerable nicety; for those intended for the plough, it is much more simple; but for both, the chief and best means are, gentleness and patience. The horse is an animal of much observation; capable of great attachment, and of equally strong resentment; if treated with kindness he becomes docile; but severity generally fails of its object, and renders him intractable. There is certainly much difference in their natural temper, some requiring much more care and time to reduce them to obedience than others; but even the most restive may be rendered manageable by mild usage.

From the moment of its being weaned, the foal should be accustomed to the halter, and to be wisped over and occasionally tied up; but this should be done by the same person who feeds it, and that care should never be entrusted to lads, who will probably teaze the animal and teach it tricks, or to any hasty, ill tempered man, who would be likely to ill treat it. The colt will thus early become accustomed to be handled and will consequently occasion much less trouble, than if he had been previously neglected. After being a day or two in the stable, a bridle should be put on; but with a small bit at first, instead of the large one usually employed by horse breakers, and which, by the horse's champing on it with impatience, sometimes occasions the mouth to become callous. He should then be led about, and accustomed to obey the rein in turning and stopping, which he will very soon learn; and, after a few days he should be completely harnessed, and put into a team among steady cattle. Care should, however be taken neither to whip him nor to force him to draw, but leave him quietly to walk with the other horses,

and in a very short time he will imitate them and begin to pull. It may then be as well to let some one mount him, even if he should not be intended to be commonly ridden, as it will render him the more docile; but this had better be done while he is in the team, as the other horses will prevent him from plunging. Let no violence be used; for such is his power of observation, that while he will readily learn every thing that he is taught, he will also recollect many things that might be wished forgotten; thus, if flogged for starting at any particular object, he will only start the more on meeting it again, for he will remember the chastisement it occasioned; and if hurt in shoeing, or on any other occasion, he will never forget the pain it occasioned, and will never suffer a repetition of the same without impatience.

*Castration* is commonly performed when the colt is twelve or eighteen months old: some defer it longer, thinking that the later the operation is performed, the more strength and spirit he will have acquired; but it is attended with great danger at that period; and it is much to be doubted whether it may not even be prejudicial to his temper. It is, besides, to be observed, that the severity of the operation occasions a check to his growth, which is more felt and of more consequence at an advanced period, than when he is quite young. It is also worthy of consideration, in a pecuniary view, that the older the animal is, the greater will be the loss, in case he should die; and therefore perhaps the most prudent time will be, during the summer the foal is sucking. Fears are sometimes entertained of performing the operation in hot weather, lest inflammation take place; but extreme heat may be avoided, and there is even less danger from that than from cold, and the exercise of running with the mare will promote the suppuration, which will also be assisted by the warmth of her milk. At a more advanced age the colt should be guarded from wet, and not allowed to drink cold water till the suppuration is complete.

## SECTION IV.

### OF THE BREEDING, REARING, AND MANAGEMENT OF SHEEP.

Among the various animals given by the benevolent hand of Providence for the benefit of mankind, there is none, perhaps, of greater utility than the sheep; which not only supplies us with food and clothing, but also affords constant employment to numerous indigent families, in the various branches of the woollen manufacture; and thus contributes, in no small proportion, to the productive labor, and commercial prosperity and opulence of a people.

In a wild, or natural state, the sheep is a vigorous animal, lively, and capable of supporting fatigue; when domesticated, indeed, it loses these properties, but amply compensates for the absence of them, by the superior advantages arising from the rearing of this sort of cattle. In fact, sheep constitute a material part of a farmer's live stock and profits; and as particular attention has of late years been bestowed on the im-

provement of the respective breeds, we shall first present the reader with an introductory view of them: which will, we trust, convey an adequate idea of the principal varieties, together with their specific characters, and the peculiar advantages they respectively possess. The general management of these animals will afterwards form a subject of discussion.

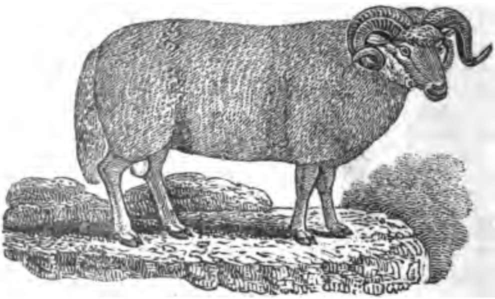
The sheep is an inhabitant of every part of the globe, from Iceland to the regions of the torrid zone. According to Linnæus, they are the hornless, horned, black-faced, Spanish, many horned, African, Guinea, broad-tailed, fat-rumped, Bucharian, long-tailed, Cape, bearded, and morvant; to which some add the Siberian sheep, cultivated in Asia, Barbary, and Corsica, and the Cretan sheep, which inhabits the Grecian islands, Hungary, and Austria.

The principal countries in which special attention has been paid to sheep, are Spain, parts of Germany, France, Great Britain, and the United States. The present article will relate principally to the different breeds of sheep raised in Great Britain, as these embrace the principal varieties to be found in the countries already alluded to.

The following synopsis will give the reader not only a knowledge of the different breeds of sheep in Great Britain, but many interesting particulars concerning them.

# SYNOPSIS
OF THE
## DIFFERENT BREEDS OF SHEEP IN GREAT BRITAIN.

| | | | | Average weight of fleece per lb. | Average weight of wethers per quarter. | Years old when killed. |
|---|---|---|---|---|---|---|
| | | | | | *lbs.* | |
| Heath | large horns | black faces and legs | coarse long wool | 3 1-2 | 14 | 4 1-2 |
| Exmoor | horned | white faces and legs | long wool | 4 1-2 | 15 | 2 1-2 |
| Norfolk | large horns | black faces and legs | fine short wool | 3 1-2 | 18 | 3 1-2 |
| *Wiltshire | horned | white faces and legs | short and moderately fine wool | 2 3-4 | 20 | 3 |
| Dorsetshire | small horns | ditto | fine short wool | 3 1-2 | 18 | 3 1-2 |
| Dishley | polled | ditto | long wool | 6 | 22 | 2 |
| Lincolnshire | ditto | ditto | ditto | 9 1-2 | 25 | 3 |
| Romney Marsh | ditto | ditto | ditto, good quality | 7 | 24 | 2 1-2 |
| Teeswater | ditto | ditto | long wool | 9 | 28 | 2 |
| Dartmoor Notts | ditto | ditto | ditto | 8 | 22 | 2 1-2 |
| South-down | ditto | gray faces and legs | very fine short wool | 3 | 18 | 2 |
| Cannock Heath | ditto | gray faced | short fine wool | 3 | 20 | 3 |
| Herefordshire | ditto | white faces and legs | very fine short wool | 2 1-2 | 14 | 4 1-2 |
| Shropshire Morf | polled and horned | speckled faces and legs | short fine wool | 2 | 15 | 4 1-2 |
| Herdwick | polled | ditto | short wool | 2 | 10 | 4 1-2 |
| Cheviot | ditto | white faces and legs | fine short wool | 3 | 16 | 4 1-2 |
| Dunfaced | ditto | dun faces and legs | ditto | 1 1-2 | 7 | 4 1-2 |
| Shetland | ditto | colors various | fine cottony wool | 1 1-2 | 8 | 4 1-2 |
| Pure Merino | horned | white faces and legs | short and very fine wool | 3 | 10 | 6 |
| Half Merino | partake of the various descriptions of the crossed breed | | ditto | 4 1-2 | — | — |



## LINTON, SHORT, OR FOREST SHEEP.

I. The Heath, Linton, Short, or Forest Sheep depicted above, are names indiscrmiinately given to the several varieties of the same breed, which is found in the north-western counties of England, and thence forward to the western highlands of Scotland.

*The specific characters* of this race are, large spiral horns; faces black or mottled, and legs black; eyes wild and fierce; carcass short and firm; wool long, open, coarse and shaggy; fleece averaging about three pounds and a half, at four years and a half. They are of a hardy constitution, admirably calculated for elevated, heathy, and exposed districts; and, judging from this aptitude to support the hardships of constant exposure in a wild pasturage country, as well as from the form of the horns, which is characteristic of the animal in its unimproved state, it may be not improbably inferred, that they are directly descended from the parent stock of the kingdom. The true black faced breed is said to be distinguished by a lock of white wool on the forehead, termed the snow lock.

The other *horned breeds* of English sheep are,

II. The Exmoor and the Dartmoor, which derive their names from the districts in the northern and western parts of Devonshire, where they are chiefly found. They are long woolled, with white legs and faces, and are delicately formed about the head and neck; they make very finely flavored mutton; and arrive, when fatted, at two and a half to three years old, to fourteen and sixteen pounds weight per quarter.

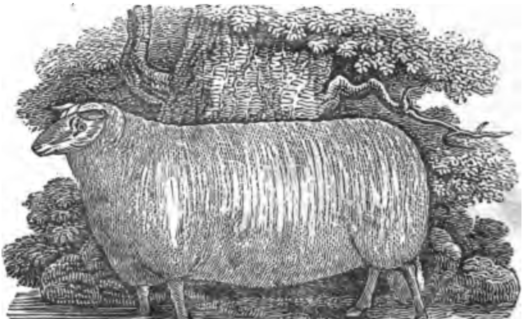
III. The Norfolk Breed is indigenous in the counties of Norfolk and Suffolk. The horns are large and spiral; bodies long; loins narrow, with a high back and thin chine; the legs long, black or gray; of a roving, wild disposition, and not easily confined within any but strong inclosures. The wool is short, weighing about two pounds per fleece, and the flesh is well flavored, and of a fine grain, but only fit for consumption in cold weather.

IV. The Wiltshire Breed, are distinguished by large spiral horns, bending downwards, close to the head, they are perfectly white in their faces and legs; have long Roman noses; with large open nostrils; are wide and heavy in their hind quarters; and light in the fore quarter and offal, but with little or no wool on their bellies. The quality of the fleece is that of clothing wool of moderate fineness, averaging about two

pounds and a half in weight; and the carcasses of the wethers when fat, usually weigh from 65 lbs. to 100 lbs.; the mutton good; they sometimes however, reach much higher, and may be considered as our largest breed of fine woolled sheep.

V. The Dorset Breed have small horns, with white faces and legs; their wool is of an intermediate kind, between long and short, and of middling fineness, weighing from three and a half to five pounds per fleece; and the carcass averaging eighteen pounds per quarter, of excellent mutton. They are a hardy race, being chiefly bred on open downs, and inured to the fold; but their principal value consists in the peculiar forwardness of the ewes, which take the ram at a much earlier period than any other species, and are therefore much sought for, and command high prices for the purpose of producing house-lamb for winter consumption.

The polled sheep may be divided into two classes—the *long*, and the *short* woolled—the peculiar merits of which have for many years formed a subject of discussion among agriculturists. Each has valuable properties, and efforts have been made to blend them by crosses, but without complete success; nature seems to have intended them for different soils, and the short woolled breeds, which thrive upon the bleakest hills, degenerate when removed into rich pastures, which are alone capable of maintaining the long woolled species.



THE LEICESTER SHEEP.

VI. The Leicester sheep take the lead among the *long woolled kind;* and of these there are three nearly distinct species:—1. The *forest sheep;* 2. The *Old Leicester;* 3. The *New Leicester* or *Dishley breed*—portrayed above—which are an improved kind of the latter species. Their forms are handsome; color white. Their heads are clean, and small, their necks short, and their breasts full; their bodies are round, with broad, straight backs, but the bellies rather light, or tucked up; their legs and the whole bone are fine and particularly small in proportion to their size; their pelts thin, and the wool long, and fine of its kind, generally averaging seven pounds to the fleece. They are of a quiet disposition, fatten early and kindly, and are capable of being brought to a great weight, on a smaller proportion of food than other breeds of the

same size, the fat wethers generally weighing (when shear hogs) twenty five pounds per quarter, and the ewes twenty-two pounds; the flesh is fine grained and well flavored; but too fat to please most palates.

VII. The Lincolnshire Breed so nearly resemble the old Leicester that they require little further description. They have white faces and legs, the bones large, and the carcass coarse; the back long and hollow with flat ribs, but good loins and deep belly; forward loose shoulders, a heavy head, with a large neck, and sinking dewlap; the hind quarter broad, the legs standing wide apart, and a large dock. The pelt is particularly thick, and the fleece consists of very long combing wool, of a rather coarse quality, but weighing generally from twelve to fourteen pounds on the wethers, and from eight to ten on the ewes.

VIII. The Teeswater Breed differ from the Lincolnshire in their wool not being so long and heavy: in standing upon higher, though finer boned legs, supporting a thicker, firmer, heavier carcass, much wider upon their backs and sides; and in affording a fatter and finer-grained carcass of mutton: the two year old wethers weighing from 25 to 35 lbs. per quarter. Some particular ones at four years old have been fed to 55 lbs. and upwards. There is little doubt that the Teeswater sheep were originally bred from the same stock as the Lincolnshire; but by attending to size rather than wool, and constantly pursuing that object, they have become a different variety of the same original breed. The present fashionable breed is considerably smaller than the original species; but they are still considerably larger and fuller of bone than the midland breed. They bear an analogy to the short-horned breed of cattle, as those of the midland counties do to the long-horned. They are not so compact, nor so complete in their form as the Leicestershire sheep; nevertheless, the excellence of their flesh and fatting quality is not doubted, and their wool still remains a superior staple. For any rich, fat land, they are singularly excellent.

IX. The Romney Marsh Sheep have existed immemorially on that rich tract of grazing land, on the southern coast of the counties of Kent and Sussex, from which they take their name. In their pure state, they are distinguished by white faces, a considerable thickness and length of head, and a broad forehead, with a tuft of wool upon it; a long and thin neck, and flat-sided carcass. They are wide on the loin, but have a sharp chine, and the breast is narrow, and not deep; the belly large; a good cleft; the thigh full and broad, carrying the chief weight in the hind quarter; the tail thick, long and coarse; the legs thick, with large feet, the muscle coarse, and the bone large. The wool is a good combing quality; the fleece of fattening wethers weighing from eight to nine pounds; the mutton is equal to that of any of the large polled breeds, and their proof being good, they are favorites with the butchers. When fat, the wethers usually average from ten to twelve stone each, and the ewes from nine to eleven. They are very hardy; are bred with little care, on wet and exposed land, requiring, after the first year, when they are wintered on the uplands, no other food in the severest situation than occasionally a little hay, in addition to their pasture; and are fattened entirely on grass.

X. The Devonshire polled sheep form two distinct varieties of the same breed:—

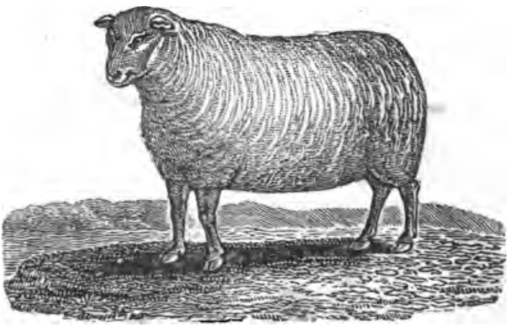
SOUTH DOWN SHEEP.

1. The *South Devon*, or *Dim faced Nott*, with brown face and legs; crooked backed, flat sided, coarsely boned and woolled animal, carrying a fleece of 10 lbs. average weight, and averaging 22 lbs. per quarter of good mutton, at 30 months old.

2. The *Bampton Nott*, with white faces and legs, though in other respects nearly resembling the former in appearance; but the wethers will, at 20 months old, average as much weight of carcass, as the others at thirty; and if kept on for another year, will reach when fat, as much as 28 lbs. per quarter; they are not however, equally productive of wool; for at the first period they only yield about 6¼ lbs., and at the latter 9 lbs.

Another variety of long woolled sheep is found on the *Cotswold Hills*, to which most of the remarks already made on the Devon breeds will equally apply.

The chief of the *short woolled* polled breeds, are—



THE SOUTH DOWN SHEEP.

XI. The South Down, of which the specific characters are,—Faces and legs gray; bones fine; head clean; neck long and small; low before; shoulder wide; light in the fore quarter; sides and chest deep; loin broad; back bone rather too high; thigh full, and twist good: wool very fine and short, (the staple being from two to three inches in length,) weighing an average of two pounds and a half per fleece, when killed at two years old. Flesh fine grained, and of excellent flavor; quick feeders; constitution hardy and vigorous. They are round in the general appearance of the barrel; and, from standing wide on their hind legs, and being shut well in the twist, the leg of down mutton is remarkably round and short, not only cutting handsomely for the table, but weighing heavier than common in proportion to the fore quarter; which are material advantages to the butcher, as they command a ready sale, at an advance of a penny per pound over the other joints. Fat wethers usually average about eighteen pounds per quarter.

These sheep have been bred for ages past on the chalky soils of the South Downs in Sussex; and on such short pasture, and in such ex-

posed situations, they are perhaps the most valuable breed in the kingdom; but they are spreading fast, not only into similar districts, but into countries better calculated for long woolled and larger sheep. The figure delineated on the preceding page, is from a South Down ewe, bred by Mr. Ellman of Glynde.

XII. The CANNOCK HEATH sheep are bred upon an extensive waste, so named in Staffordshire; they are very generally grey faced; without horns; bear fine wool; and from many points of similitude between them and the South Down breed, it has been thought that they were originally derived from the same stock. The bone, however, is coarser; nor do they possess the same beauty and compactness as the Downs; but these defects probably arise from inattention on the part of the former breeders, which the present flock masters are making efforts to rectify; and to counterbalance them, the carcass is heavier, and the mutton equally good.

XIII. The RYELAND BREED, is so called from a district in the neighborhood of Ross, in Herefordshire. They are small, white faced, and hornless; the wool growing close to their eyes; are light in the bone; have small, clean legs; and when proper attention has been paid to the breeding stock, possess a great compactness and symmetry. The ewes weigh from nine to twelve and fourteen pounds and the wethers from twelve to sixteen pounds per quarter, when fatted, at three to four years old, and their flesh is equal to any mutton in the kingdom. The fleece does not average more than two pounds; but the quality of the wool is unrivalled by that of any of our native stock.

A cross has been made between this breed and the Spanish sheep, the produce of which are termed *Merino Ryelands* and the wool *Anglo merino.*

In some of the neighboring counties to Herefordshire, both in England and Wales, there is a breed of sheep very much resembling the Ryelands, known as the

*Shropshire morf.* They bear wool of a fine quality; generally have white faces and legs, though sometimes a little freckled; are tight in the bone, and have small clean limbs. There are two species, which, from inattention to the breeds, are often blended. The one polled, the other having small, light crooked horns,—a still smaller variety, bred on the mountains, and in high estimation for the table, but which is generally known under the common denomination of *Welsh.*

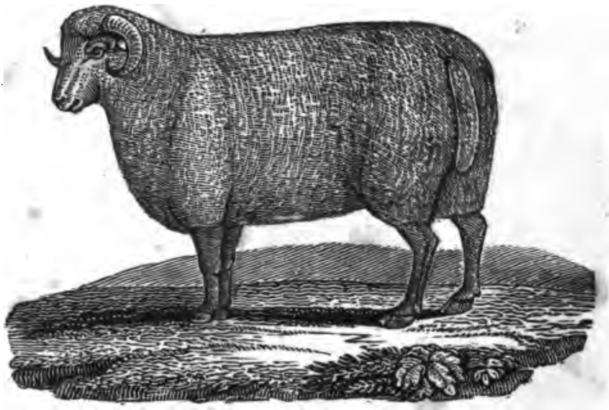
XIV. The CHEVIOT SHEEP, were originally bred upon the hilly districts in the north-west part of Northumberland, but have since spread over many of the mountainous tracts in the neighboring counties, and have even nearly superseded the horned breed of black faced sheep in some parts of the Highlands of Scotland. They are hornless, and their faces and legs are in general white, though formerly the prevailing color was black. The best breeds have an open countenance, with lively prominent eyes; long bodies but wanting depth in the breast, and on the chine; and fine, clean, small boned limbs. They are seldom slaughtered until they have attained the age of four to four and a half years, when the fat wethers will average from 12 lbs. to 18 lbs. per quarter, fattening kindly, and producing mutton of excellent quality. The wool is inferior to that of most other of the short woolled polled breeds, and

appears to have been injured by some late attempts to improve the carcass.

The sheep known as the *Herdwick breed*, though smaller than the Cheviot, and only found in one rocky and mountainous district at the head of the Duddon and Esk rivers, in Cumberland, (Eng.) appear to be only a variety of the same race.

Another variety, termed the *Dun-faced breed*, is found in the exposed northern districts of England. The faces of the sheep are of a dun or tawny color; the animals are smaller in size; have short tails; and are not so hardy as the preceding sort. The wool is variously streaked with black, red, brown, or dun, and partly of a fine texture, weighing about a pound and a half per fleece, when killed at four years and a half. Flesh finely grained, and of excellent flavor.

The *Shetland breed*, a nearly similar race, derives its name from the islands on the north coast of Scotland, where these sheep are reared. The wool is very fine and soft, fit for the finest manufactures; the fleece weighs upon an average from one to three pounds. The Shetland sheep are very hardy, but too wild to be confined.



MERINO, OR SPANISH SHEEP.

XV. The Merino, or Spanish Sheep, a wether of which breed is above delineated—have horns of a middle size, of which the ewes are sometimes destitute; faces white; legs of the same hue and rather long; shape not very perfect, having a piece of loose skin depending from the neck; bone fine; pelt fine and clear.

The wool of the Merino sheep is uncommonly fine, and weighs, upon an average, about three pounds and a half per fleece. The best Merino fleeces have a dark brown tinge on their surface, almost amounting to black, which is formed by dust adhering to the greasy, yolky properties of its pile: and there is a surprising contrast between it and the rich white color within, as well as the rosy hue of the skin, which peculiarly

denotes high proof. The Merinos are natives of the northern provinces of Spain, and were first introduced into Great Britain in the year 1787; but it was not until 1792 that any effectual measures were adopted towards improving the English breeds by a Spanish cross. In the last mentioned year, the late king of England received several rams of the Negretti breed; but so great was the force of prejudice, that notwithstanding the manufacturers confessed the wool of the Anglo-Spanish cross to be of prime quality, yet not one individual bid for it a price at all equal to what they paid for good Spanish wool. From these sheep imported by the king, and from the great exertions of the late lord Somerville, (who at an immense expense imported a flock of choice merinos) great benefit has been derived to the wool, by crossing this sort with the best British breeds; although the produce of the cross has not been improved in shape. The most successful cross has been with the Herefordshire, the fleece of which is heavier, in proportion to the carcass, than that of any other known breed in Europe; the average weight of the fleeces of two shear-ewes being estimated at four pounds and a half avoirdupois, in an unwashed state; and the fleece of a fat wether of the same age will be from five to seven pounds.

In Spain, the sheep from which these flocks have been obtained, are bred in the northern provinces of the kingdom of Leon, and of Segovia and Soria, in Old Castile, and the district of Buifrago, in New Castile; from whence, after being shorn, they are driven southward at the approach of winter, and dispersed over the plains of Estremadura, La Mancha and Andalusia, until the return of summer, when they travel back to their native pastures; and whether from instinct or habit, they are said to display symptoms of restlessness as the time approaches for their change of pasture. They are in consequence termed *Trashumante* flocks; and there is a code of regulations, sanctioned by the authority of law, for the government of the shepherds during these periodical migrations. The ancient pasturages in the south are secured to them at a fixed rate. A strip of land, of considerable width, is left in pasture at each side of the road for their accommodation, without which they could not travel with convenience; and the greatest attention is paid to secure these privileges. By thus removing them at the different seasons from north to south, and back again, they are kept in a nearly equal temperature, and it probably is to that advantage that the superiority of the wool of the Trashumante flock is to be attributed; that from those which remain stationary being far inferior; as a proof of which the *Caceres*, or Estremaduran wool, grown in one of the central provinces, commands little more than half the price of the *Leonesa*. It must however be admitted, that, in Spain, it is a disputed point, whether the travelling flocks are really benefitted by the equality of the climate thus obtained; some stationary flocks in the province of Segovia being said to produce as fine wool as any of the Trashumante.

If the supposition that changing the pasture is beneficial, be correct, it follows that these sheep, exposed to the variable climate of this country, will necessarily change the quality of their fleece, upon which climate is known to have the greatest influence. It may, indeed, be said, that the change might even then be advantageous; for a certain degree of cold is rather favorable than otherwise to the growth of fine wool; and its improvement in Saxony, into which country the Spanish breeds were in-

troduced about half a century ago, might be adduced as an instance in point. But in Germany these sheep are regularly housed during the winter; they are also kept, during that season, on dry fodder, which may be supposed to have a material effect on the fleece, for the Spanish sheep are kept on bare, and generally burnt up pasture, without even tasting artificial food; and our own finest woolled flocks are maintained on the scanty herbage of the downs.

In France,—where the royal flock of Rambouillet, picked from the best in Spain, was introduced in 1785,—the sheep suffered greatly by the cold until housed; and although the Merino breed has been since naturalized in that country,* and still retains the fineness of the texture of the wool, yet it loses in softness and in strength of staple.

The Trashumante flocks have existed from a very early period in Spain. There is an ancient tradition that the original stock was obtained from this country; but it has not been traced to any authentic source. In the sixteenth century, they were calculated at seven millions; but their numbers have since much diminished, and they are now supposed not to exceed five.

The chief flocks are those of *Paular*, which belonged to a richly endowed monastery of that name in Segovia—of *Negretti*, the property of the Marquess of Campo d'Alaug—of the *Escurial*, formerly belonging to the crown; and those owned by the Duke de l'Infantado, the Marquis d'Iranda, and Perales, and Count San Rafael; each of which consists of from 40,000 to 60,000, and the average weight of the fleece is estimated at 5 lbs.

In respect to the sheep at the present day, found in the United States, it cannot be necessary to enlarge, since few probably are unacquainted with the breeds of their native country.

It may be proper to observe, however, that before the introduction of the merino breed, there were, besides the common and coarse woolled sheep of the country, three kinds of sheep, which, for a time, attracted some attention, viz. the Otter, the Arlington, and the Smith's Island sheep.

The Otter sheep, it is said, were first discovered on some island on our eastern coast. This sheep is distinguished for the extreme shortness of his legs, which are also turned out, in such a manner as to render them rickety. They appear, observes a writer, as if their legs had been broken, and set by an awkward surgeon. They have not been extensively propagated among us.

The Arlington long-woolled sheep were derived from the stock kept by Washington at Mount Vernon. They appear to have been derived from a Persian ram, intermixed with the Bakewell or New Leicestershire breed.

The origin of the Smith's Island sheep (an island which lies in the Atlantic ocean, immediately at the eastern cape of Virginia) cannot be precisely ascertained; but they are supposed to be the indigenal race of the country, discovered somewhat less than half a century since, and

* By a treaty made between France and Spain, during the French Revolution, 5000 ewes and 500 rams, of the best Spanish breeds, were placed at the disposal of the French Government.

improved by the hand of nature. The wool of this sheep is said to be soft, white, and silky; but not so fine as the merino wool.

The introduction of the merino sheep forms an era in the history of agriculture, and we may add of manufactures in our country. The first merino sheep ever imported into the United States, were two pairs sent into the country in the spring of 1802, from France, by Robert R. Livingston.

Shortly after, a much greater number were introduced by the late Col. Humphreys, directly from Spain.

Since that period, importations of Merinos, Saxony, South Down, &c. &c. have been frequent.

It cannot be doubted, from the experiments already made, that the United States of America, particularly the country which lies north of the Chesapeake, is well adapted to the breeding of sheep, not only from the fine herbage which every where crowns our hills, and furnishes that sort of pasture, which is especially adapted to sheep; but also from the singular exemption of our sheep from most of the diseases, which so frequently diminish the flocks of Europe.

So much has been written on the subject of the breeding, rearing and management of sheep, to which probably most of our readers have access, that we deem it unnecessary to notice this subject otherwise than to select from the best writers the results of their experience touching a few of the most important items, which will naturally claim the attention of the wool grower.

*Essential requisites to a good ram.*

"His head should be fine and small; his nostrils wide and expanded, his eyes prominent, and rather bold and daring; ears thin, his collar full from his breast and shoulders, but tapering gradually all the way to where the neck and head join, which should be very fine and graceful, being perfectly free from any coarse leather hanging down; the shoulders broad and full, which must at the same time join so easy to the collar forward, and chine backward, as to leave not the least hollow in either place; the mutton upon his arm, or fore-thigh, must come quite to the knee; his legs upright, with a clean, fine bone, being equally clear from superfluous skin, and coarse hairy wool from the knee and hough downwards; the breast broad and well formed, which will keep his fore legs at a proper wideness; his girth or chest, full and deep, and, instead of a hollow behind the shoulders, that part, by some called the fore-flank, should be quite full; the back and loins broad, flat, and straight, from which the ribs should rise with a fine circular arch; his belly straight; the quarters long and full, with the mutton quite down to the hough which should neither stand in nor out; his *twist* (i. e. the junction of the inside of the thighs,) deep, wide, and full, which, with the broad breast, will keep his fore legs open and upright; the whole body covered with thin pelt; and that with fine, bright, soft wool."

*Signs of a healthy sheep.* These are a rather wild or lively briskness; a brilliant clearness in the eye; a florid ruddy color on the inside of the eyelids, and what are termed the eyestrings, as well as in the gums; a fastness in the teeth; a sweet fragrance in the breath; a dryness of the ose and eyes; breathing easy and regular; a coolness in the feet; dung

properly formed; coat or fleece firmly attached to the skin, and unbroken; the skin exhibiting a florid red appearance, especially upon the brisket. Where there are discharges from the nose and eyes, it indicates their having taken cold, and should be attended to by putting them in dry sheltered situations.

*Signs of the age of Sheep.* The age of sheep is determined by the state of their teeth. In their second year they have two broad teeth; in their third year, four broad teeth; in their fourth year, six broad teeth; and in their fifth year, eight broad teeth before. After which, none can tell how old a sheep is while their teeth remain, except by their being worn down. About the end of one year rams, wethers, and all young sheep, loose two fore teeth of the lower jaw; and they are known to want the incisive teeth in the upper jaw. At eighteen months, the two teeth joining to the former, also fall out; and at three years, being all unplaced they are even and pretty white. But as these animals advance in age, the teeth become loose, blunt, and afterwards black. The age of the ram, and all horned sheep, may also be known by their horns, which show themselves in their very first year, and often at the birth, and continue to grow, a ring annually to the last period of their lives.

*Time of purchasing sheep.* With respect to the time, or proper age for purchasing sheep intended for breeding, there is a difference of opinion; but the most experienced breeders recommend them to be procured a short time previously to shearing, from the farmer, grazier, or owner's house; because they will be seen in their natural state, and the real depth of the staple may also be easily ascertained, without the possibility of any fraud or imposition being practised on the buyer by the vender.

*Breeding of ewes.* Ewes generally breed at the age of fifteen or eighteen months, though many experienced breeders never admit the ram till they are two years old. Much, however, depends in this respect, on the goodness of the food, as well as on the forward or backward state of the breed. The choice of ewes, therefore, ought to be made with care and discrimination, not only as to the characteristic marks which ought to be the same as those of the ram, but also with regard to the breed; for, with sheep, as with other cattle stock, no certain degree of excellence can be attained, *unless the female possess an equal degree of blood with the male.* In particular, a purchaser should see that the animals are sound; and in order to ascertain this point, it will be desirable to examine whether the teeth are white, the gums red, the breath not fœtid, the eyes lively, the wool firm, and the feet cool; qualities these which afford a certain criterion of health or disease.

During the period of gestation, ewes require great attention, lest any accident should occasion them to *slip* their lambs; and if that should take place, it will be proper to separate them instantly from the rest of the flock. It will, therefore, be necessary to keep them in the same manner as cows, while going with calf, namely, upon a moderate or tolerably good sheltered pasture, where no object can disturb them, though if this should fail, it will be advisable to give them turnips, or similar green food, under the like precautions, till within the last two or three weeks before their yeaning. In the breeding of cattle, indeed, it is a maxim which ought to be steadily kept in mind, that nothing can be more pre-

judicial to the females, than to fatten them during gestation; and with respect to ewes in particular, this rule should be more carefully observed than with regard to any other animal; for if they be fed too high while they are going with lamb, they will undergo great difficulty and pain in yeaning; whereas, unless they are put into a little heart before that period arrives, they will not only be deficient in strength at the critical moment; but also be destitute of a sufficient supply of milk for the support of the lamb, and consequently both the dam and her progeny must be greatly weakened, if they do not actually perish from such mismanagement.

*Owning of lambs.* It often happens, says Mr. Grove, that ewes will not own their lambs, particularly the first they bear; and in this case I would advise to the sprinkling of a little salt on the lamb, which induces the ewe to lick it, after which she will generally allow it to suck. If not, the ewe with her lamb should be placed in a separate enclosure, (of which several should be previously prepared) and fed with the most nutritious fodder, particularly with nourishing liquids, that the udder may be uncomfortably distended; and if this be not sufficient, she must be tied by the legs till the lamb has been once suckled; after which there will be no farther difficulty.

*Weaning lambs.* This depends upon various circumstances. If the parent ewe is broken mouthed, or so faulty in wool or in shape, as to render it desirable to get rid of her, the lamb must be weaned early, so as to admit of her being fattened in season; if she is admitted to the ram as soon as she is disposed to take him, the earlier she will fat. If the object is to render the lambs as large as possible, and they are of such a stock as to make the ewes of comparatively less value, it will be best to let the lambs run with them till they wean themselves; because they undoubtedly grow the more rapidly for it. This mode, therefore, I would recommend, when a merino flock is to be engrafted upon a common one. But if the ewes are valuable, it certainly will be best to wean the lambs so early as to give the ewes some respite, before they take the ram again; and, indeed, if early lambs are preferred, early weaning is absolutely necessary, as the ewe will seldom take the ram when exhausted by nursing. In Spain, they leave the lambs with the ewe till they wean themselves. In France, and generally in England, they are weaned at three and four months old. In order to prevent the lambs from falling off, when they are weaned, they should be put into a piece of young tender grass, with an old quiet ewe or wether to direct their movements; they should also be out of sight and hearing of their mothers, that they may the sooner forget each other. If the keeping them apart be inconvenient, they may be brought together at the end of a fortnight. Some attention should be paid to the ewes for the first week, in order to prevent their suffering a too great flow of milk, which should be taken from them every day or two; and perhaps it would be best, till their milk is dried up, to keep them in scanty pastures.

*Winter management.* It is recommended to give ewes with lamb, a somewhat more than ordinary quantity of food, for a month or six weeks before they are expected to yean. Not enough, however to make them fat, as dangerous consequences might attend their being in a very high condition at that period. Turnips are said to be injurious to ewes with lamb, but may be well given them after they have yeaned. If your

sheep, whether store sheep, or ewes with lamb, have good hay, about a quart of potatos a day to each, will, it is said, be very beneficial, and an ample allowance. Potatos, besides their use as *food* for sheep, are said to be very serviceable as an article of diet, which usually supersedes the necessity of *medicine*. They have, when given raw, an opening or purgative quality, which is thought to be of use, and answer a similar purpose with sheep, which is effected with swine by brimstone and antimony. Potatos baked, steamed or boiled, will furnish more nutriment than those which are raw.

Care should be taken to place in the stable small tubs or troughs of water for the sheep to drink in. They will do very well in the summer without water, as they feed when the dew is on; but they need water in winter, especially if fed mostly on dry food. When sheep have colds, and discharge mucus from the nose, good feeding, together with pine boughs given occasionally, will cure them; or tar spread over a board over which a little fine salt is strewed, will induce sheep to lick up the tar, and this will cure a cold. Half a gill of corn a day, given to each sheep during the winter, is recommended as keeping them in good heart, preventing the wool from falling off, and enabling the ewes to rear their young, better than they would if fed altogether on food of a less substantial nature.

*Quantity of food.* Writers do not agree on the quantity of food, which a given number of sheep will consume to advantage in a given time. According to Mr. Lawrence, a sheep will eat twenty pounds of turnips in twenty-four hours; but that one gallon of potatos will generally suffice. The size of the sheep he does not give. The same writer also states that the quantity of food required by a sheep, compared with an ox, is as one to eight or nine. Daubenton, a celebrated French agriculturist, gives the following as the result of an experiment which he made on this subject. "I confined," says he, "in a small space, two sheep about twenty inches high, (the height of most woolled animals in France.) By way of experiment, I caused the sheep to be fed during eight days, solely on grass, newly cut, and weighed before placed in their rack. Care was taken to pick up and place back again, all that the sheep let fall, and to weigh that which they would not eat, in consequence of its being too tough, or because it possessed some bad quality. From this trial, frequently repeated, it appeared that a sheep of the middle stature, eats about eight pounds of grass in a day. The same experiments, conducted with the same preciseness, in regard to the fodders of hay or straw, have proved that a sheep of middling height likewise eats daily two pounds of hay, or two pounds and a half of straw.

"In order to ascertain how many pounds of grass go to one pound of hay, I caused the grass to be weighed as soon as cut: it was then spread on cloths exposed to the sun, so that none might be lost, though at the same time well dried. Being thus converted into hay, I found its weight reduced to one fourth; eight pounds of grass had given only two pounds of hay."

*Manner of feeding.* "One thing, (says M. Tessier,) cannot be too much recommended, which is to place the hay in the racks while the sheep are out of the house; by this precaution, the dust will not fall upon the fleeces." Dr. Draw observes, that the rack in which the hay is put should be upright, so that in feeding, the seeds, chaff, &c. should not

fall into the wool, about their necks. Under the racks should be a trough for catching the seeds of the hay, and feeding the sheep.

*Salt.* With regard to giving salt to sheep, writers have disagreed. It is believed to be better not to give them any, than to allow them too great a quantity. M. Tessier says, "sheep have been known to be attended with long and troublesome looseness, in consequence of having taken too much salt; which has induced the belief that sea-water is poisonous to them: and that his sheep had always been healthy, though he had never given them any salt." But he states that it may be indispensably necessary in wet countries. And Dr. Cooper, editor of the last edition of the Domestic Encyclopedia, recommends one fourth of an ounce a day, as a proper quantity for sheep. Mr. Grove likewise says, "salt is required by sheep at intervals, during the whole year; but it is often given in too great quantities, and almost forced upon the sheep; which is often injurious, and often injures the digestion, so that the best grain will pass through them unaltered. The best mode, where rock salt is to be had, is to attach pieces here and there in a stable or pasture, and let them lick it as they wish. The usual calculation is from one to two pounds yearly, per head; but I have usually found that something less than one pound was quite sufficient, and more than this is not given in Saxony to the best managed flocks."

*Folding.* Cotting or folding of sheep, is a practice more or less extensively followed with particular breeds, and in particular districts; but now generally on the decline. It was formerly thought to be indispensably necessary to the success of the farmer in different districts: but of late a different opinion has prevailed, except in particular cases, and it is considered as merely enriching one field at the expense of another. The object is to enrich the arable land; but as this is done at the expense of the pasture, it is truly, as Bakewell expresses it, "robbing Peter to pay Paul."

*Marking.* An English writer gives the following:—Mark on either side of the nose of the sheep, the initials of the owner's name, and on the opposite side, any number by which he may choose to designate the particular sheep, by means of a small iron letter or figure about an inch long; which being dipped in common oil colors, mixed with turpentine to dry them more readily, is placed on the part described, and will continue until the next shearing season. The process is easy, and will give the animal no pain; the marks cannot be readily obliterated, which is not the case with tattooing or cauterizing.

## SECTION V.

### ON THE BREEDING, REARING, AND FATTENING OF SWINE.

It is the remark of a writer, that those animals which are most essential to the comfort of man, have been most widely diffused by a kind Providence. Among these animals we must certainly rank swine. They are to be found in all latitudes, between the frozen regions on the north and south. Of domestic stock, few varieties are more profitable to the breeder than swine. While the number kept on a farm is proportioned

to the quantity of offal on the premises, especially as the attendance they require, is, when compared with that of others, very trifling, and the benefit arising from their manure, more than counterbalances the expense of such attendance.

The characteristic marks of a good hog are, a moderate length, as to the carcass in general; the head and cheek being plump and full; and the neck thick and short; bone fine; quarters full, the carcass thick and full; his bristly hide fine and thin; the symmetry or proportion of the whole well adapted to the respective breeds or varieties; and above all, a kindly disposition to fatten early.

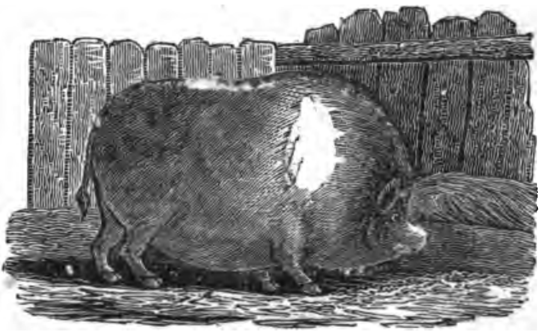
### DIFFERENT BREEDS OF SWINE.

Swine differ greatly in different countries, in respect to size, color, &c. &c. In Piedmont, they are universally black, and this color obtains so generally throughout Italy, that swine's flesh is often called, in the language of that country, *nero*, or black. In Normandy, their color is white, but in the neighboring country of Bavaria, it is reddish brown. In Hungary and Sweden, swine are often found with solid hoofs, although in other countries they are universally cloven footed.

The parent stock of the domestic swine of Europe, is doubtless the wild boar, which is still found in some of the forests of France, Germany, and other parts of Europe, as well as those of Persian India.

Wild boars usually live in families and are hunted as an amusement, in all parts of the world in which they are found. The *flesh* of the wild animals, if they are not old, is said to be much superior to that of our domestic swine. That of the young ones is peculiarly delicate. Of an old wild boar, the head only is at all eatable.

Considerable attention has been paid to swine in England, where almost every county has its peculiar breed. These varieties are in part, it is said, the effects of crossing the European variety with the Chinese, some account of which we shall here give.



CHINESE BREED.

1. The CHINESE BREED, of the general appearance of which the above is a tolerably correct delineation, when fat, were originally obtained, as

their name imports, from China. Of these, there are two nearly distinct kinds: the *white* and the *black;* both are small; and although of an extraordinary disposition to fatten, will seldom arrive to a greater weight than sixteen or eighteen stone of fourteen pounds, at two years of age. The former are better shaped than the latter; but they are less hardy, and less prolific. They are both very small limbed; round in the carcass; thin skinned, and fine bristled; and have the head so bedded in the neck, that when quite fat, the end only of the snout is perceptible. They are tender and difficult to rear, and the sows are bad nurses; yet from their early aptitude to fatten, they are in great esteem with those who only rear young porkers. Their flesh is rather too delicate for bacon; it is also deficient in lean; and their hind quarters being small, in proportion to the body, they cut up too disadvantage; they, however, possess the valuable properties of being very thrifty, and of fattening on a comparatively small quantity of food.

There is also a *mixed breed* of this kind, being white, variously patched with black; some of which have prick ears, like the true breed, which they otherwise resemble in form, and others have the ears round at the ends, and hanging downwards.

BERKSHIRE BREED.

II. The Berkshire Breed, is distinguished by being in general of a tawny white or reddish color, spotted with black; large ears, hanging over the eyes; thick, close, and well made in the body; legs short, small in the bone; having a disposition to fatten quickly; and when well fed, the flesh is fine. Berkshire has been long famous for its breed of swine, which, as it now stands, is in the third class, in point of size, excellent in all respects, but particularly as a cross for heavy, slow feeding sorts. It has extended itself from the district from which it takes its name over most parts of England; it is the sort mostly fatted at the distilleries; feeds to a great weight; is good for either pork or bacon; and is supposed by many to be the most hardy, both in respect to its nature, and the food on which it will thrive.

III. The Essex Half Black pigs, are apparently descended from the Berkshire stock, and may be reckoned among the finest breeds in England. They are black and white, short haired, fine skinned, smaller

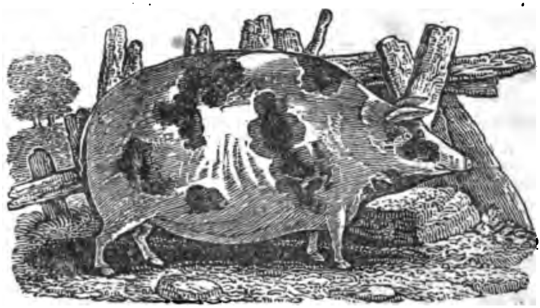
heads and ears than the Berkshire; but the latter are feathered with inside hair, which is a distinctive mark of both; short, snubby noses, very fine bone, broad and deep in the belly, full in the hind quarters, but light in the bone, and offal; the sows are good breeders, and bring litters from eight to twelve; but they also have the character of being bad nurses.

Mr. Western describes them as feeding remarkably quick, growing fast, and being of an excellent quality of meat; and he considers them at least equal, upon a fair comparison of age, food, and weight, to any other sort whatever.

The *Sussex Breed* is either a variety of the Essex, just described, or as some assert the original stock. It is smaller than the Berkshire, and of a very handsome form, the general size when full grown, seldom exceeding eighteen or twenty stone of fourteen pounds. The bone is not particularly small but it is clean; the animal is of a kindly disposition to fatten, and arrives at maturity sooner than any other kind.

The *Dishley Breed*, which were at one time as celebrated as all the other kinds of Mr. Bakewell's stock,—are remarkably fine boned and delicate, and are supposed to be partly descended from crosses of the Berkshire and Chinese. They are certainly carried to great perfection, and have reached to considerable weight in a very small compass, being when fat, nearly equal in height, length, and thickness, their bellies nearly touching the ground, and their eyes scarcely to be seen for fat; the whole carcass appearing a solid mass of flesh.

The form of these pigs possesses considerable beauty, and is well calculated to lay on a large quantity of meat compared with their bone and offal. They also keep themselves in a good condition, on a moderate quantity of food, and are easily fattened.



WOBURN, OR BEDFORD BREED.

IV. The Woburn Breed, of which the animal portrayed above was exhibited at Lord Sommerville's Cattle Show, in 1806, is a new variety, introduced by the Duke of Bedford. They are of various colors, well formed, hardy, very prolific, kindly disposed to fatten, and have attained to nearly twice the weight of some other hogs, within the same given period of time.

Besides these, there are:—

HAMPSHIRE AND CHESHIRE BREEDS.

The *Hampshire*, the specific characters of which are—color chiefly white; neck and carcass long, and the body not so well formed as the Berkshire pigs; but they fatten kindly to a very great size and weight, and make excellent bacon.

The *Northampton*, which are also white, with very short legs, ears enormously large, often sweeping the ground; size large, with coarse bone and hair, and many bristles. They fatten to a great size, but not very kindly, and are reared chiefly in the county of Northampton.

The *Shropshire*, which appear to be a variety of the Northampton race, to whose characteristics they bear a great resemblance; fattening to a large size, but not so kindly disposed as the Berkshire; yet they are both favorites with the distillers, who seem to require a coarse, heavy pig to consume their wash and grains with advantage.

The *Yorkshire*, which are similar in color to the Berkshire, but with longer ears, and coarser hair. They have long legs, flat sides, and are coarse in the bone; they are also slow feeders; but for the reasons already assigned, they, as well as the Northampton and Shropshire, are in esteem with the distillers.

The *Lincolnshire*, with well formed heads, and ears of medium size, pointing forward and curled at the tips; they are long and straight from the head to the tail, and of sufficient breadth; round in the carcass and deep in the sides; the skin and hair thin. The true bred pigs of this race are white, and rather tender; but they reach to thirty stone of fourteen pounds, and in point of profit may be ranked next to the Berkshire. This breed is also known (with some occasional variation) as the *Norfolk* and *Suffolk.*

The *Cheshire*, of various colors, but chiefly marked with broad patches of black, or blue, and white, have large heads, with long pendant ears; are of a great length, but proportionally narrow; curved in the back, and flat sided; large boned, and long legged, with much loose skin, and are altogether ill formed; but they grow to an extraordinary weight and are the largest kind of pigs in the kingdom, except the *Rudgwick breed* which take their names from a village on the borders of Surry and Sussex, and are remarkable for the enormous size to which they reach.

Each of these breeds has its several advocates; but as their respective value does not, as in other species of stock, depend on soil and situation, these differences of opinion can only be ascribed to the want of sufficient comparative experiments, or to prejudice. A very competent and apparently a very candid judge of the merits of the principal kinds, gives it as his decided opinion, that the Berkshire rough haired, feather eared, curled pigs are superior in form and flesh to all others, even to the best Chinese.

To the foregoing might be added many other varieties and sub-varieties in England; but it is deemed unnecessary to be more minute.

The hog is not a native of America, but was brought hither by Europeans. Until within a few years, the principal breed of hogs to be found in the United States, strongly resemble the old Irish breed—a long legged, thin sided, lank, haggard race, which scarcely attain to their full size short of two or three years, and two or three of which require all

the corn commonly raised on a good sized farm, to get into a decent condition for the barrel.

Within a few years, however, more attention has been paid to this important subject; more valuable breeds have been introduced, which have been crossed to advantage in the country. We have crosses from the Chinese, Russian, Dutch, Spanish, and English breeds. Of the latter, we have the Bedfordshire, Berkshire, Suffolk, Sussex, Lincolnshire, Hampshire and other families. In general, however, there is room for extensive improvement, in respect to our swine. Among the breeds deservedly in high repute in New England, at the present time, is the Bedford or Woburn breed. The history of its introduction is both curious and interesting, and for it we are indebted to the Hon. Oliver Fiske, of Worcester, Mass., as we are to his zeal for its extensive dissemination, in various parts of New England, and other sections of the United States.

According to this gentleman, the breed—a boar and a sow—were sent by the Duke of Bedford—after whom they are in this country called—but in England are better known, it is believed, by the name of the "Woburn breed," as a present to Gen. Washington. They were committed to the care of an English farmer by the name of *Parkinson.* This man took a farm in the neighborhood of Baltimore; but, instead of sending the swine to Gen. Washington, he sold them. Being highly esteemed by Gen. Ridgely, of Maryland, who became acquainted with their excellence, he sent a pair of them to Col. Pickering, of Massachusetts, in a vessel bound to Salem. From Col. P.'s stock, Mr. John Reed, of Roxbury, obtained the breed, and of the latter, Dr. Fiske obtained parts of several litters, which he transferred to Worcester. The pure breed is, perhaps, nearly the perfection of the race—judiciously crossed with our native breed, greatly improves the latter. To the excellency of the above breed, Gov. Lincoln and several other gentlemen have borne the most ample testimony. See New England Farmer, Vol. III. p. 222.

The importance of a general introduction of such a breed of swine as the foregoing, to the farming interest of the land, can scarcely be estimated. Although the keeping of a moderate number of even the old breeds, was advantageous to the farmer, and almost essential, inasmuch as they would feed upon things which would otherwise be of no considerable service to him; yet the fattening of such swine usually proved a serious tax upon the granary, and often before the farmer's pork was in the barrel, his stock of corn was exhausted. Too much apathy in respect to the improvement of this part of the farmer's stock, it is believed, still generally prevails.

Next to the importance of a good breed, is the proper management of them. That management will vary according to their age and other circumstances. The suggestions we design to make will respect these animals, distinguished into the following classes;—1. Sows with pig; 2. Pigs; 3. Store Pigs; and 4. Fatting Hogs.

I. With respect to *sows with pig*, it is obvious that they should be better fed than either of the two following classes, in order that they may be enabled to supply their young litter with the necessary supply of milk; but while care is thus taken to keep them in good condition, equal caution is necessary that they be not too fat. Thus, for such a litter in the

spring, tares and cabbages, combined with the waste milk and wash of the house and dairy, may be employed with advantage; or, if the supply from the dairy be not adequate to the demand, a wash may be prepared with oat, barley, or other meal. For those which litter in autumn, lettuces have been found very wholesome and nutritive, in addition to the wash; and in the winter season, potatos, Swedish turnips, and other roots, previously prepared by boiling, should be added.

II. With regard to young pigs, they may be fed, after being weaned, in the same manner as sows; but it is eminently important that their food should be so nutritious as that they should be continually in a growing state. No food is better for them, it is well known, than milk; and nothing scarcely promotes their growth more rapidly than corn soaked in milk, or milk thickened with corn and oatmeal combined. It may be remarked, also, that young pigs seldom do well when constantly confined in the pen. More than at any other period do they need to range abroad. They require also a warm and dry shelter, especially in the latter part of autumn, and during the season of winter. From inattention to these points, the growth of pigs is scarcely a moiety of what it would otherwise be, besides, that they require a much greater amount of food.

III. Store pigs are those which have attained nearly half their growth, and for these, every farmer who has it in his power, should have a good enclosed pasture, it having been found by experiment, that in a pasture of moderate dimensions, and properly managed, the same number of hogs may be kept in better condition, and probably at only a quarter of the expense, than if they were kept in the pen, upon Indian corn, or even upon roots.

The hog pasture, observes Mr. Dean, in his New England Farmer, should be so near to the dwelling house that it may not be troublesome to carry the wash to the swine, and yet so far off that the people in the house may not be stunned with their noise. A warm cot must be made in some convenient part of their pasture, for them to lodge in.

To prepare a pasture for them, let the ground be broken up, tilled and manured, and then laid down with clover. For swine are more fond of this grass, than of any other which our country produces. Let the quantity of land be so proportioned to the number of swine, that they may keep the grass from running up to seed. For this will prevent waste; and the shorter the grass is, the sweeter it will be, and the more tender and agreeable to their palates.

I suppose that one acre of rich land in clover, will support twenty or more swine, large and small together, through the summer; and bring them well forward in their growth; but they should have rings in their noses, to prevent their rooting out the clover.

It has been proved, by many trials, that hogs in such a pasture, may be kept in good plight, without any other food. Some say they may be half fattened.

Arthur Young, Esq. of Great Britain, in the summer of the year 1766, pastured sixty-four swine of various sizes, on two acres of clover ground. And allowing two pence half penny per week, one with another, their feeding amounted to seventeen pounds, sixteen shillings sterling. Their keeping was set at a low rate, six months feeding for one swine being

5*s.* 5*d.* and the profit of the clover put to this use is astonishing. He assures the public that all these swine grew very fat. And in his opinion this use of clover is greatly preferable to making it into hay. I think this is not to be doubted, though the crop of hay were supposed to be the greatest that is ever obtained.

It should be remembered, that the pasturing with swine will enrich the land more than pasturing with other beasts, and hereby the profit of the farmer will be increased. And if a common clover lay will produce a good crop of wheat, much more may be expected of the same kind of ground, after pasturing swine upon it; as their dung adds much to the fertility of the soil.

Hogs may be turned into their pasture about the first of May, and kept in till the last of October. And if in May and October the grass should not be quite sufficient for their support, some potatos or other roots may be thrown to them.

The fence about the pasture should be so tight and strong that the swine will not need to be yoked; because yokes do much towards preventing their growth, as I have found by letting yoked and unyoked ones of the same litter run together in a pasture. It will be of great advantage to a hog pasture to have plenty of water in it through the summer. Running water is best, as it will afford them the most wholesome drink, and at the same time serves as well as any other for them to wallow in; and it will keep them clean, which is of no small advantage.

The best way of managing swine, is to keep them always in middling plight. Not too fat, lest their health should be in danger, especially when the weather is hot; not too lean, lest this should give them a ravenous appetite, and tempt them to eat things that are not wholesome for them. Those that have been long starved, cannot be made fat without great expense—sometimes more than they will repay with their flesh.

When it can with convenience be so ordered, it is an excellent piece of husbandry to make a hog pasture of an orchard. Their dung is allowed to be the very best manure for the trees. They will keep the ground light and loose, destroy insects that infest the trees, and feed heartily upon the premature apples, which the farmer is too often tempted to grind up for cider. And the shadow of the trees will be very grateful and comfortable to them in summer. An orchard may be prepared with clover as well as any other piece of ground. But it should be remembered that, when the trees in an orchard are young and small, swine should not be permitted to go among them; for there will be danger of their wounding them, and stripping off some of the bark.

As a substitute for the usual mode of ringing hogs, Mr. Tubb, an English breeder of stock, recommends to shave off with a razor, or sharp knife, the gristle on the tops of the noses of young pigs. The place soon heals over, and the pigs are thus rendered incapable of rooting. Loudon recommends to cut the two tendons of their snouts with a sharp knife, about an inch and a half from the nose. This may be done with little pain, and no prejudice to the animal, when about two or three months old.

IV. The business of fattening hogs is generally performed from the commencement of October. Some farmers, and those who understand their true interests, commence somewhat earlier. According to the

opinion of Rev. Mr. Elliot, the best time in the year to shut up hogs to fatten them, is the month of August. The beginning of September, however, is sufficiently early to make them fat, provided they be of a proper breed, before the weather comes to be extremely cold.

Certain it is, that he that attempts to fatten his hogs in winter will be a loser, for it has been found by long experience, that they do not gain in their flesh near so fast in a frosty, as in a temperate season.

Whatever system of fattening swine may be adopted, it is of essential consequence that they be kept warm and clean, especially in cold and damp weather, during the period of fattening; and that they also be supplied with abundance of litter, the cost of which will be amply repaid by the increased proportion of excellent dung thereby obtained. It has, indeed, been frequently asserted that swine thrive better while fattening, if they be allowed to wallow, at home, in their own filth, and abroad in mud and wet, because they delight in it; and thence it is assumed as certain, that it tends to their advantage. Such an assertion, however, is rather the offspring of prejudice than the result of real experience; we know that animals, when oppressed with heat, will plunge into water in order to cool themselves; but it cannot be inferred from this circumstance, that it will be necessarily beneficial to them, especially when fattening. Besides, as there is an analogy between the disorders of this part of the brute creation, and those of the human race, as well as in the causes whence they originate, we shall here only remark, that swine are liable to be affected by drinking too much cold water, or wallowing in miry or humid places when overheated.

Not only, however, should these animals be kept warm and dry while fattening, but they should also be confined, if possible, by themselves; or at all events, there should be as small a number in the same stye, and as much out of the hearing of the cry or grunt of other hogs as possible; otherwise, upon their first confinement, they will pine and decrease in flesh, notwithstanding they have abundance of food given them. By this means they will be enabled to take more frequent and uninterrupted repose, which greatly contributes to promote their fattening; besides which, all those inconveniences will be effectually obviated, which often occur from hogs worrying each other, and from the weaker being deprived by the stronger of their fair proportion of food.

*Regularity of feeding* should likewise be especially regarded, as it has great influence in facilitating or retarding the fattening of swine; hence it will be proper to give them a full allowance of food three or four times, or at certain other stated intervals in the day, as convenience or other circumstances will allow. And if any animal should have surfeited itself, (which is no unusual occurrence, where due regard is not bestowed on the point last stated,) by eating too large a proportion of food, it will be advisable to give about half an ounce of flour of sulphur in some wash, once or twice in the day, for two or three successive days. By this simple remedy, their pallid appetite will be restored more effectually than by administering antimony, or any other drug that has been recommended to use in fattening swine; for, however such articles may *possibly* have succeeded in a *few* instances, it is obvious that they cannot be generally employed with advantage, and may not unfrequently be productive of hurtful effects.

It is recommended by various writers to give to fatting hogs dry rotten wood, or the ashes or cinders of the blacksmith's shop; others recommend charcoal. Nature, it is thought, points out these as preventives for several diseases, to which fatting swine are liable. The precise effect of these articles, it is, perhaps, difficult to ascertain. The rotten wood may act as an absorbent, and the cinders and charcoal serve to correct the superabundant acid in the stomach. Certain it is, that fatting swine will devour these substances with avidity, whenever they require them. I have not lost a fatting hog, says Judge Peters, for more than thirty years, when I used it, (rotten wood) but have suffered by neglecting it. Some of my neighbors met with frequent losses of fatting hogs, till I informed them of my practice; of which I was told by a woman from East Jersey, before our revolutionary war. She said it was then known and practised there.

To the good effects of charcoal, the Editor can bear his own testimony, having made use of this for his own fatting hogs for several years. He has found similar good effects to result from the use of pounded oyster shells. When sufficiently softened by exposure to the air, fatting swine will be found to eat them with avidity.

## SECTION VI.

### DISEASES OF HORSES, CATTLE, SHEEP, AND SWINE.

#### 1.—HORSES.

The brute creation are in general, liable to fewer maladies or complaints than mankind; and as their diseases are with some exceptions, less complicated, they are of course more easily relieved. Many of the diseases which afflict brute animals, might be prevented by more care, it being certain that these are often the result of the negligence or erroneous treatment of their owners. "They are either exposed too much to the rigor and changes of the weather," observes Mr. Lawrence, "or they are gorged with food, or denied a sufficient quantity, or supplied with such as is unwholesome. Hence we learn the chief causes of their maladies. Learn to *prevent* them, instead of undertaking the tedious, unsuitable, and almost hopeless task of learning to *cure* them." Although many diseases incident to our domestic animals might, as the above writer suggests, be prevented by care and vigilance, yet they will sometimes get sick under the *most favorable circumstances*, and for some of their maladies, no certain cures have as yet been discovered. It would greatly swell the limits of this work, were we to enumerate all the maladies incident to the animals which stand at the head of this article. We must therefore, confine our attention to a few of those which are of most common occurrence.

BOTTS. There are two varieties of the insects which produce the botts, one larger than the other. The larger kind are covered with down of a brownish color, with darker shades. The female deposites her eggs,

generally, on those parts of the horse where he can bite himself, especially on the anterior of the legs; but never under his throat. When she approaches the horse, she supports her body nearly upright in the air, and with one of her feet bends out a hair, on which she deposites an egg, and thus she continues to do for a short time, and then retires, probably to rest herself, when she returns to her charge. The smaller kind are covered with a darker and thicker down. Wings transparent, and without any shades. The female deposites her eggs under the throat, and no where else. As she approaches the horse, she instantly darts up under his throat and deposites an egg with incredible expedition, and then goes off, but soon returns again and again, to the great disquiet and trouble of the horse, causing him to throw up his head with violence. Each kind varies in size; but in general they are about three fourths of an inch in length.

The larvæ produced by the eggs of the above insects, penetrate through the villous, into the muscular coat of the stomach, forming small cavities in the same, and then hang by their hooks, irritating and wounding the animal. If at any time they lose their hold, they immediately catch again. Not any part of the stomach is exempted from them; but they are most numerous near the passages into and out of the stomach. They are of all insects the most tenacious of life, at this period; and at this time of their existence it is that they prove so destructive to horses.

The following experiments were made at different times, and on the larvæ three fourths grown or more.

| | | | h. | minutes. | |
|---|---|---|---|---|---|
| | Rum | | 25 | " | |
| | Decoction of tobacco | | 11 | " | |
| | Strong elixir vitriol | | 2 | 18 | |
| | Essential oil of mint | | 2 | 5 | |
| | Volatile spirit | | " | 56 | |
| | Spirit of turpentine | | " | 45 | |
| Immersed in | Decoction pink root | lived | 10 | " | No effect and experiments discontinued. |
| | Fish oil | | 49 | " | |
| | Linseed oil | | 10 | " | |
| | Tincture of aloes | | 10 | " | |
| | Brine | | 10 | " | |
| | Solution of indigo | | 10 | " | |
| | Elixir camphor | | 10 | " | |

Mercury is not so effectual in destroying the insects as is generally believed. September 16, 1806, immersed a number of small botts, with one which was full grown, in a strong solution of corrosive sublimate; the small botts died in sixty minutes; but a full grown one was taken out of the solution, six hours after its immersion, apparently unhurt.

From the preceding experiments, for which we are indebted to an able Essay on the Natural History of the Bott-Fly, by Dr. Adams, published by the Medical and Agricultural Register, it is apparent that it must be extremely difficult to destroy the larvæ in the stomach of a horse, under any circumstances, by the use of any remedy, which would not be worse than the disease.

Various applications have indeed been proposed, such as rum, aloes, jalep, brine, linseed oil, pepper, tincture of tobacco, tincture of pink root, but none of them have proved effectual. But, while we are not able to suggest a specific for this most terrible of all evils, which afflict the horse, two points deserve attention—the one by way of preventing the existence of botts in the stomach of the horse, the other by way of palliating the sufferings of the animal, when they do actually exist.

The best method of preventing the bott is perhaps once in ten or fifteen days to scrape off the eggs deposited by the insect. This should be done through the season of their appearance, July, August, and September. A sharp knife may be used, taking care not to scrape the egg where the horse will be likely to eat them while he is feeding.

When botts are found to exist in a horse, the chief object should be to remove irritation and inflammation. This should be done by blood-letting and the free use of mild oils. Blood-letting has a tendency to remove the inflammatory disposition, and should be the *first resort*, and should be frequently repeated; at the same time that mild oils are administered. Drenches may be used, but the chief dependence should be had upon allaying the irritation and inflammation by the means suggested.

WORMS. Besides botts, horses are sometimes troubled with other kinds of worms, such as *teres*, *tænia* and *ascaris*.

The *teres* or large round worm, says Loudon, sometimes occasions mischief, when it exists in great numbers, such as a staring coat, binding of the hide, irregular appetite, and clammy mouth. The best remedy is the *spigelia marylandica* or Indian pink, in daily doses of half an ounce. *Tænia* are not common in the horse; now and then they exist, and are best combated by weekly doses of oil of turpentine, three ounces at a time, mixed by means of the yolk of an egg with half a pint of ale. *The ascaris* or thread worms, are best removed by mercurial purgatives. The existence of worms may be known by the appearance of a yellow matter under the tail, and by the disposition the horse has to rub his fundament. Blaine recommends the following vermifuge; *powdered arsenic, eight grains; pewter or tin finely scraped; Venice turpentine, half an ounce*, make into a ball and give every morning. He also recommends salt to be given daily with the food, which agrees with our own experience as one of the best vermifuges known; it is a fact acknowledged by the residents along the sea coast, that horses troubled with worms will often voluntarily drink largely of sea water, and thus cure themselves.

COLIC, *flatulent, or spasmodic*, called also, *gripes, fret, or gullion*, is an important, because a frequent disease, and because it frequently destroys either quickly by its irritation, or by its degenerating into the red or inflammatory colic, when improperly treated or long continued. It is usually very sudden in its attack.

*The causes of colic are not always apparent.* It is sometimes occasioned by intestinal stones, which accumulate to a great size, remaining for years in the cells of the colon, until some accidental displacement occasions an interruption to the peristalic motion. Cold in various forms is a parent of colic; but under the form of cold water given when a

horse is hot, it is most common. In some horses it is so frequent as to become a constitutional appendage.

*The distinguishing marks between colic and inflammation of the bowels* are gained, according to Blaine, by attending to the following circumstances. In gripes the horse has violent fits of pain, but they remit, and he has intervals of ease. The pain in red colic is more uniform and less violent. In gripes, the pulse is, in general, natural; in red colic it is quicker than natural, and commonly small. The extremities are not usually cold in gripes; in red colic they usually are. In gripes, the horse attempts to roll on his back, which in red colic he seldom does. There are no marks of fever with gripes, as red eyelids, inflamed nostrils, &c., but in red colic they are always present. When the complaint has continued some hours, it is always proper to bleed to prevent its ending in inflammation; bleeding in the mouth is quite useless. Backrake, and throw up clysters of warm water, one after another as fast as possible, which often overcomes the irritation. La Fosse recommends a curious remedy, but as it can always be obtained, and has the sanction of long experience it may be tried. An onion is pounded and mixed up with some powdered savin; in default of which, use powdered ginger. This is to be introduced up the rectum as high as possible, and the horse is to be then moved briskly about. An onion put up the fundament, whole, has long been a domestic remedy. The following is recommended by Blaine: *spirit of vitriolic æther, an ounce; powdered opium, one drachm; oil of turpentine, three ounces; warm ale, a pint.* He also recommends the following more simple remedy as always at hand; *the expressed juice of two or three large onions; common gin, common oil, of each half a pint;* mix and give. White recommends a pint of brandy, or of gin, with water, as an excellent carminative. Clark, who has expressly written on gripes, extols the virtues of a mixture thus made; which, if it have the qualities he attributes to it, and which there is no reason to doubt, no agriculturist, coach, or post master should be without; *pimento berry, called also allspice, ground fine, half a pound; spirits of wine, and of water, of each a pint and a half;* infuse these together, and keep it for use. Give a quarter of a pint every hour until full relief is obtained; hand rubbing, wisping, or fomenting the bowels with hot water at the time.

Inflammation of the bowels or red colic, is a very distinct disease from the gripes, gullion, or fret, with which it is however, very apt to be confounded, to the destruction of many horses. The peritoneal inflammation of the bowels, the one here treated on, is an affection of their outer covering.

*The causes are various.* It is not unfrequently brought on by a sudden transition of cold after great heats, as swimming during hunting, or from the removal of a horse from grass at once into heated stables, clothing and hard feed; neglected gripes, or long continued costivenesss, excessive riding, and the immediate drinking of cold water, have brought it on. It begins by restlessness, loss of appetite, some uneasiness; the mouth is hot and dry, the inner membranes of the mouth, nose and eye lids, are often redder than natural. As the disease advances, the pain before not violent, now increases, so as to force the horse to lie down and rise again frequently; and when very violent, he kicks at his belly, or looks round at his sides, pawing his litter very frequently. The pulse

is usually small, thick, or hard; sometimes it is more full and small, but always hard. Breathing is quickened, the extremities are alternately hot and cold, but continue longer cold than hot; and the animal is costive; sometimes pain may force away a few hardened balls of fæces, but the principal contents are retained. Blaine has given the distinguishing features between this disease and colic, under which head we have stated them.

*The treatment* must be active and immediate, or a fatal termination may be expected. Begin by abstracting a considerable quantity of blood; from a large horse to the amount of seven or eight quarts; proceed to back-rake, throw up a large clyster of warm gruel. Give by the mouth, a pint of castor oil, mixed by the means of the yolks of two eggs, with half a pint of broth or gruel. Or, give olive oil instead, following it up in half an hour by a gruel drench, in which six ounces of Epsom salts have been dissolved. A sheep skin, immediately as it is removed from the sheep, may be applied to the belly, which should first be well rubbed with the strong liquid blister. (*Vet. Pha.* 13.) In four hours repeat the bleeding, if considerable improvement have not taken place, and if the bowels be not unloaded, give more oil, and clyster frequently, having first back-raked. Avoid exercise; first hand rub, and afterwards wrap up the extremities to the knees. As a clear passage for the dung is found, the symptoms mitigate, and the animal slowly recovers; but he must be fed at first very sparingly.

LAMPAS. All horses, but particularly very young ones, are liable to enlargement of the rugæ, or ridges of the palate, dependent not on any local disease, confined to the part itself, but occasionally by an affection of the whole passage of the mouth, throat, and stomach. It is usual to attend to the part only, which is scarified or burnt to little purpose, when a mild dose of physic, or gentle alteratives, would prove more certain expedients; to which may be added, rubbing the part with bay salt, or with vinegar.

BRIDLE SORES. When the bit in colt breaking, or in hard pulling horses, has hurt the bars, care is requisite to prevent the bone becoming carious. Touch daily with ægyptiacum, and cover the bit with leather, unless total rest can be allowed.

POLE EVIL. This complaint commonly requires the attendance of an experienced practitioner—but the prevention is often in the power of owners and others about horses, and to this point we shall particularly direct their attention. Pole evil is commonly the effect of accident. Repeated small blows of the manger, or continued pressure from hanging back on the halter, &c. will, if not remedied, produce swelling at the nape of the neck, with some tenderness. In this early state, if the collar be removed, and the part be kept continually wet with vinegar and water, the swelling will often disperse—but if, in spite of this, it proceeds to suppuration, let a vent be made for the matter by a seton, [116] so that it may readily flow out. Introduce nothing healing, but encourage a free discharge, and it may heal at once. When such is not the issue, the disease attacks the ligaments, sinuses form, and the matter burrows under the skin and muscles, when a seton must be introduced from the opening above, and should be brought out at the bottom; the seton should be then daily wetted with the liquid blister. (*Vet. Pha.* 13.) Should

this plan fail, escharotics will be required in the form of scalding mixture. (*Vet. Pha.* 37.)

STRANGUARY, *or suppression of urine; incontinence of urine; bloody urine.* Stranguary may arise from an injury done to the kidneys, or to the bladder, by strains, or by the absorption of irritating matters. In these cases, bleed if there be fever, and if not, merely give the horse absolute rest; mash him, give gruel, and warm his water for drink. *Bloody urine* should be treated in the same way; some horses have such a natural or acquired weakness of the kidneys, as to stale blood with their urine on every occasion of over exertion; the means frequently used for relief, are such as aggravate the complaint, and indeed are often the occasion of it, which are diuretics. Strong diuretics injure horses more than strong physic, and benefit them less than any other of the popular means made use of. In retention of urine, but particularly in cases of bloody urine, they are absolutely improper.

MANGE. This is a contagious disease, not uncommon among low bred and badly kept horses, but which is seldom generated in those properly managed. When it is the effect of impoverished blood, a different course of feeding must be substituted, not heating, but cooling, though generous: as carrots, speared oats, malt mashes, stable soiling, &c. When it arises in full fed horses, bleed twice, lower the feeding, substituting for corn, soiling, carrots, or bran mashes. Give a nightly alterative, (*Vet. Pha. No.* 1 *or* 2,) and dress with either of the mange dressings, (*Vet. Pha.* 43.) After a cure has been effected, carefully clean all the apartments with soap and water.

GLANDERS. This is a disease which is highly infectious, but which, according to Loudon, is extremely difficult if not impossible to cure.

The marks of glanders are a discharge of purulent matter from ulcers situated in one or both nostrils, more often from the left than the right. This discharge soon becomes glairy, thick, and white-of-egg like; it afterwards shows bloody streaks, and is fœtid. The glands of the jaw of the affected side, called the kernels, swell from an absorption of the virus or poison, and as they exist or do not exist, or as they adhere to the bone or are detached from it, so some prognosis is vainly attempted by farriers, with regard to the disease; for in some few cases, these glands are not at all affected, and in a great many they are not bound down by the affection of the jaw. As there are many diseases which excite a secretion of matter from the nose, and which is kept up a considerable time, so it is not always easy to detect glanders in its early stages. Strangles and violent colds keep up a discharge from the nostrils for weeks sometimes. In such cases a criterion may be drawn from the existence of ulceration within the nose, whenever the disease has become confirmed. These glanderous chancres are to be seen on opening the nostril a little way up the cavity, sometimes immediately opposed to the opening of the nostril; but a solitary chancre should not determine the judgment. The health often continues good, and sometimes the condition also, until hectic takes place from absorption, and the lungs participate, when death soon closes the scene.

The *treatment of glanders*, it has been already stated, is so uncertain that it is hardly worth the attempt; however, when the extreme value of the horse or the love of experiment leads to it, it may be regarded as fix-

ed by experience, that nothing but a long course of internal remedies, drawn from the mineral acids, can effect it. These have been tried in their endless variety: White recommends the mildest preparations of mercury as *æthiops mineral;* under the conviction that the more acrid preparations disturb the powers of the constitution so much as to destroy as effectually as the disease. At the veterinary college the *sulphate of copper* (blue vitrol) has been long in use. Others have used the *sulphates of iron and zinc.* Clark recommends the daily administration of a drink or ball composed of the following ingredients: *sulphate of zinc,* 15 *grains; powdered cantharides,* 7 *grains; powdered allspice,* 15 *grains*: of which he gives one or two extraordinary proofs of utility.

Shoulder Strains. These are very rare, most of the lameness attributed to the shoulder belonging to the other parts, and particularly to the feet. Out of one hundred and twenty cases of lameness before, Blaine found that three only arose from ligamentary or muscular extension of the shoulder, or rather of the adductor and sustaining muscles; when shoulder strain does happen, it is commonly the consequence of some slip, by which the arm is forced violently forwards. It is less to be wondered at than at first seems probable, that farriers mistake foot lameness for shoulder strains, when we reflect that a contracted foot occasions inaction and favoring of the limb; which thus wastes the muscles of the shoulder. Seeing that one shoulder is smaller than the other, the evil is attributed to that, and it is pegged, blistered, swam, and fired, to the torture of the animal, and the increase of the foot's contraction by the confinement. In real shoulder strains, the toe is dragged along the ground while in motion; at rest it is planted forward, but resting on the point of the toe. When the lameness is in the foot, the horse points his foot forward also, but he does so with the whole limb unbent, and the foot flat. These differences are highly necessary to be attended to, as well as the peculiar difficulty there is in moving down hill, which he does with reluctance, and by swinging his leg round to avoid flexing it. This lameness may be further brought to the test by lifting up the fore leg considerably, which if the evil be in the shoulder, will give evident pain. The muscles between the fore legs are likewise tumified and tender in these cases.

The treatment consists, when it is recent, in bleeding in the plate vein, rowelling in the chest, and fomenting with hot water two or three times a day. When the heat and tenderness have subsided, first bathe daily with the astringent wash for strains, (*Vet. Pha. No.* 6.) for a week; and afterwards, if necessary proceed to blister in the usual manner.

Galls. When a horse is galled by the saddle or harness, or when he is chafed between the arm and chest, an accident which frequently happens in travelling through muddy roads, the following lotion will be found serviceable;—Sulphate of zinc, one ounce; superacetate of lead one ounce; water, one quart.

Wind Galls. When wind galls make their first appearance, they are easily cured by a bath and bandage. Boil red oak bark to a strong decoction, add some sharp vinegar and a little alum, let the parts be fomented twice a day, warm as the hand can be held in it; then take a woollen cloth, dip it in the bath, and bind the ancle up, tight as possible, without giving pain to the horse.

Should this method not succeed after a thorough trial, the swelled or

puffed part may be opened with a sharp knife, but blistering with flies is less dangerous, and generally attended with equal success.

RING BONE. This is a hard and bony substance which generally reaches half way round the ancle, and causes a horse to go stiff and lame. When it first makes its appearance an application of corrosive sublimate, added to Spanish flies and Venice Turpentine, mixed with hog's lard, may be useful. But when a ring bone has attained to its full size, we know of no remedy.

BROKEN WIND. This, when once fastened upon a horse, admits not probably of a perfect cure, but may be relieved in a measure, by a careful attention to diet. The food should be compact and nutritious. Corn is better than oats, and old hay which has been well kept better than new. During the grass season, the disease often almost disappears, but recurs in the winter, during which, potatos may be given to advantage; also carrots, parsnips, and beet roots. Molasses in small quantities has been recommended, also tar water; but more dependence, probably, may be placed on lime water. In case the symptomatic cough be troublesome, bleeding will be found highly advantageous.

FOUNDER. "A horse may be foundered," says Mason, in his excellent work entitled, "Gentlemen's New Pocket Farrier," and which we take the liberty to recommend to our readers, "by excessive hard rides, permitting him to plunge deep into cold water, while hot and sweating, and drinking his fill of cold pond water, eating large quantities of new corn and fodder, and then briskly exercised; over feeding with bran alone whilst performing hard labor, drinking plentifully at every branch in travelling, feeding with more than a horse can eat, after being half starved, violent exercise on a full belly, or not permitting a horse who has travelled in a hot sun all day, to cool thoroughly before he is given as much as he can eat, drink, &c.

*Symptoms of a Founder.*—The symptons that indicate an approaching founder, are so few, and so common, that the most ignorant persons will rarely be mistaken. Great heat about the legs, pasterns and ears, a soreness in the feet, together with a stiffness so great in all his limbs, that the animal frequently refuses to move, unless force is used—his flanks and lower part of his belly draw up, his hide becomes bound or tight, his legs thrown a little more forward than in his usual or natural position; a constant thirst, and very often a considerable swelling of the ancles, &c. &c.

*Remedy for a Founder.*—So soon as you are convinced that your horse is foundered, take from his neck vein at least one gallon of blood; give a drench of one quart of strong sassafras tea, one table spoon full of salt petre, and a quarter of an ounce of assafœtida, and do not permit him to drink for five or six hours, at the expiration of which time, should he not be evidently better, repeat the bleeding, take half a gallon of blood, and give another drench; at night offer him some bran or oats, scalded with sassafras tea, and if it can be procured, let him have green food, fresh from the field, for it has the happy effect of opening the bowels and cooling the system; his feet should be nicely cleaned out and stuffed with fresh cow manure; his drink should be at least one half sassafras tea, with a small handful of salt thrown therein.

By the morning, should the horse be better, nothing further is neces-

sary only being careful not to over feed him. But should there be no change for the better, tie a small cord just above his knees, and with a lancet or phleme, bleed in a vein that runs around the coronet, just above the hoof; take from each leg a pint of blood; give a pound of salts dissolved in three half pints of water, in form of a drench. Keep his feet stuffed with fresh cow manure, and bathe his legs with equal parts of sharp vinegar, spirits, and sweet oil or lard. By attention to these directions, in two or three days, the horse will again be fit for service.

A horse in this unpleasant situation, requires great attention. Whenever they are foundered, they search for a bank of manure to stand on, which should always be prevented, as its heat increases the fever.

Horses slightly foundered, have sometimes been cured in a few hours, by standing them in pond water or mud, or by bleeding in the mouth, but those remedies are uncertain, and are not so much to be relied on as those first recommended.

A foundered horse is generally very much reduced in flesh, before a cure is effected; and always most s[illegible]ect to founder afterwards.

Large ridges on the hoofs, or a [illegible]g up of the feet are strong indications of old founders or other in[illegible]s.

## 2.—CATTLE.

Colic or Gripes. When afflicted with colic, the diseased animal will rise up and lie down almost incessantly, continually striking its head and horns against any object that occurs. Young cattle are chiefly affected by the colic, which is attended either with a *scouring*, or with *costiveness*, and which of course must be treated according to those two circumstances. In the former case, a warm draught should be given, consisting of one quart of ale, mixed with a few drops of laudanum, and two or three ounces of oil of sweet almonds; or, which, perhaps, is preferable, with half a pint of olive oil, and sweetened with sugar. This draught is to be repeated at the end of twelve hours, or oftener, as the nature of the case may require. When colic is accompanied with costiveness, the following purge should be given as early as possible.—Dissolve from four to six drachms of fine Barbadoes aloes, (according to the size of the beast and the urgency of the case,) in half a pint of brandy, or other ardent spirit; mix the infusion with two quarts of water gruel, and administer the draught in a lukewarm state. In both cases, great and speedy attention is necessary to prevent inflammation of the intestines, which must otherwise prove fatal; the beasts should be kept warm and dry in order to promote perspiration.

Hoven. No distemper is of more frequent occurrence among cattle than that of being swollen, that is, *blown* or *hoven*, as it is usually denominated among farmers. It is induced either by exposure to damp situations, by too sudden removal from an inferior to a rich pasture, or by eating too eagerly of turnips, clover, or any other succulent food, especially before the dew is off in the morning; thus the stomach is loaded with food, and the process of rumination, or chewing the cud, being prevented, the animal becomes swollen with confined air, which pene-

trates into the stomach and intestines. Its preventive is obvious, and consists simply in turning cattle into such rich pastures, only when they are not pressed by hunger, so that their appetite may soon be gratified; or they should be gently driven about for a few hours, that the dew may not only have time to evaporate, but also the animals being thus suffered to graze a very short time at once, their stomachs will become gradually accustomed to it.

Various remedies have been tried and recommended, for this malady, which, if not opportunely discovered, inevitably proves fatal. Of these, the most common is to make an incision with a pen-knife beneath the short ribs, when a quill, or small tube of ivory, or smoothed elder, is introduced in order to give vent to the confined air; the wound is then covered with adhesive plaster, to prevent it from being affected by the external cold, and thus the danger is in general quickly removed.

The method here noticed appears to be the result rather of absolute necessity than of mature thought, though sanctioned by custom; and as it is liable to be attended with fatal consequences through the ignorance or inexpertness of the operator, it becomes necessary to resort to more easy remedies. Medicines, indeed, are seldom of any particular service, on account of the distance to which country people are often obliged to go in order to procure them; but the following recipe, (which we communicate from Mr. Young's "Annals of Agriculture," Vol. xxxiii.) being composed of simple, cheap, and common ingredients, promises to be useful. Let three quarters of a pint of olive oil, and one pint of melted butter or hog's lard, be mixed together, and given to the animal by means of a horn or bottle; if no favorable change be produced in a quarter of an hour, the same quantity may be repeated. This dose is calculated for neat cattle; for sheep, when hoven or blown, a wine glass full and a half, or two glasses, will be sufficient to be given in like manner. And it is asserted in the communication above cited, that this remedy is a specific for the malady in question, effecting a cure within the short period of half an hour. Where, however, the pen-knife is resorted to—and necessity alone can justify it—*the incision ought to be made with a small pen-knife, very sharp at the point, with a sudden push*, four inches from the hip bone, and four inches *from the edge of the loin.*

A writer in the American Farmer recommends a spoon full of hartshorn infused in water, which he says completely removes the distension; others recommend soda and potash, all of which, combining with the carbonic acid gas—the cause of the distention—will immediately reduce it. For want of these, lye from wood ashes may be employed.

When the animal has obtained relief one of the following drinks is recommended by Dr. White; No. 1. powdered ginger, half an ounce; spirits of nitrous ether, 2 ounces; oil of peppermint, 30 drops; warm water, one pint. Mix for one dose.

No. 2. Powdered caraway, 1 ounce; ginger, 1 drachm; warm ale, or warm water, 1 pint. Mix.

No. 3. Powdered gentian, 1 ounce; Cascarilla bark, 2 drachms; warm ale, or water, 1 pint.

INDIGESTION OR LOSS OF THE CUD. Mr. Lawrence says, that in this disease, "the beast mourns and has no appetite, or drops its food without attempting to swallow it. Probably from defective irritability of the fibres

or contracting muscles of the *rumn* or cud bag, the animal is unable to throw up or ruminate; of course the bag remains loaded or obstructed. The intention is to remove the obstruction, and invigorate the animal fibres. Let the animal fast some time, then give a warm bran or pollard mash, with good hay, and warm water with salt. This treatment alone may succeed with patience, even should the maw be obstructed by acorns or other hard fruit. An aloes tincture, made with brandy and ginger, or capsicum, (red pepper) might be of use in this case. After conquering the obstruction, bitter infusions made of camomile, hoarhound, oak bark, &c., in beer, may be required as restoratives, although, perhaps, good dry nourishing feed will have an equally good effect."

It is remarked by Mr. White, that "the earlier stages of this complaint are not marked by very striking symptoms. The animal has a dull or languid appearance, and generally a rough unhealthy coat and tight skin. The appetite is diminished, and at length he ceases to chew the cud. The eyes and mouth have generally a yellow appearance."

"To cure this disease it should be attacked at an early period; for when the liver has become affected in a considerable degree, it terminates fatally. Should there be any appearance of costiveness, the following warm laxative is first to be given; more commonly, however, the bowels are in a loose state, and the dung has an unhealthy appearance; in this case let the tonic drench be given morning and evening, and let the animal be kept in a warm sheltered situation. It may be necessary to repeat, that this, like most other internal diseases of cattle, may generally be removed by timely attention; but in attempting a cure after they have existed some time, a great deal of unnecessary expense is often incurred."

*Warm laxative.* Barbadoes aloes, half an ounce; castile soap, 6 drachms; ginger, 3 drachms; cascarilla bark, 2 drachms; warm water, 1 pint. Mix.

After the operation of the laxative, the following tonic drench may be given should it be found necessary:—Of cascarilla bark, and ginger, each 2 drachms; soda, 2 drachms; to be given in a pint of ale, beer, or warm water.

JAUNDICE or *Yellows.* This disease may be known principally by the yellowness of the eyes and mouth; a dull or languid appearance, and debility; a loss of appetite also, is a common symptom. It may be distinguished from the former disease by the costiveness which uniformly attends it, and by the animal appearing to be in more pain. At the commencement of the disorder, a cure may generally be accomplished, by giving the warm laxative directed for the foregoing complaint, and repeating it, after an interval of five or six days, giving in the intermediate time, the following drink every morning and evening.—Castile soap, half an ounce; Venice turpentine, half an ounce; ginger 3 drachms; powdered gentian root, 1 ounce. Rub the soap and turpentine together in a mortar, until they are incorporated, then add gradually, a pint of water, and afterwards the ginger and gentian. In the more advanced stage of this disorder, the liver is generally so injured as to render a cure impossible.

## DISEASES OF CATTLE.

FOUL IN THE FOOT, or *hoof-ail.* Dr. Peck, an English writer, has given the following account of this disorder and its treatment.

The first appearance of this disease is a hard crack between the claws or hoofs, attended with considerable inflammation; afterwards, a fœtid and offensive matter is discharged, similar to that of the grease in horses's heels; sometimes it appears in form of a large tumor upon the coronet, between the hair and the hoof, attended with violent pain and inflammation.

Wash the parts from all dirt, Castile soap should be used, and if between the claws, take a rope of proper thickness and chafe the part afflicted, and afterwards dress it with the butter of antimony, or oil of vitriol. Let the animal stand in a dry place for an hour; repeat the application every day. If the part be much affected, rub it with some stimulating ointment, and if the tumor be likely to suppurate, linseed poultices as often as are necessary, should be applied, and repeated till the inflammation has subsided; then dress the wound with lint and mild astringent ointment. Due regard must be paid to existing symptoms. A few doses of Glauber's salts will cool the body and accelerate the cure.

Edward Skellet, Professor of the Veterinary art, an English writer of reputation, says that this disorder proceeds from two causes; the one from accidents, and the other from a morbid state of the system. Its situation is betwixt the claws of the cow, either in the fore or hind feet, but more frequently in the former. It is always attended with a swelling, the discharge from which, when it breaks or cracks, has a very offensive smell. The *accidental foul* proceeds from gravel, flint, bones, or any other hard substance getting between the claws, which produces great pain and inflammation. The first step to be taken for its cure, is to remove the hard substance, and clean the wound out; then the following ointment is to be applied to the part, spread on tow, and bound on with a cloth and string.—Soft soap, 1 lb.; common turpentine, 1 lb. Melt over a slow fire till the two articles are completely united. The dressings may be repeated two or three times, which never fail to complete a cure.

Another application is recommended in the fourth volume of the Massachusetts Agricultural Repository, viz. From one to three grains of corrosive sublimate, reduced to a fine powder, to be applied, as *nearly as may be*, completely into the slit, to be repeated once in twenty-four hours, until the cure is effected. Care should be taken to put a piece of rag, or bit of leather between the claws, lest the animal by licking the foot, should be injured by the corrosive sublimate. An ox, it is said, may be kept at work while affected with this disease, without injury, unless his lameness be so great as to impair his condition.

GRAIN SICKNESS. The first symptoms of this disease are a dull, heavy appearance about the eyes of the animal; she frequently shifts about from one side to the other, or when let loose or driven about complains very much. On examining her, a fullness may be perceived betwixt the hips and ribs, on the opposite side to the milking one; if pressed with the hand, this fullness will be felt to consist in the extension of the stomach. As the disease advances, a loss of milk ensues, and a total dislike to any food.

This disease is caused by a surfeit of grain, and its remedies are

bleeding and purging; the first to relieve the urgent symptoms, the second to remove the cause of the malady. The quantity of blood, according to Dr. Skellet, should not be less than two or three quarts, but as he prescribes for large cows in the vicinity of London, perhaps a smaller quantity would be preferable for animals of but a midling size. The purging drink recommended by the same author, is as follows;—Sulphur, from 8 to 12 ounces, proportioning it to the strength of the animal; nitre, 2 ounces, turmeric and cummin seeds, of each 1 ounce.

When this has operated in unloading the stomach, the weakness of that organ, the loss of appetite which ensues, and the deficiency of milk connected with it, will be repaired by medicines of an aromatic and bracing nature, such as coriander, ginger, anisseed, &c. Diluent liquors and mashes, form the proper food for some days.

A writer in the New England Farmer recommends to give either to horses or cattle, which have eaten too much grain a pint of melted hog's lard, as soon as the fact is ascertained.

Warts, or *Horney Excrescences.* These are affections of the skin, which, in cows, do not go deep; they destroy the roots of the hair wherever they form, and are of a firm horny texture, and readily give way when pulled or roughly handled, which occasions them to bleed, and shows their connexion with the vessels of the skin. They readily yield to emollient ointments, particularly to goose grease, which should be frequently rubbed on them till the excresences fall off.

Mange. This is a cutaneous disease which is very contagious, for so many cows as come in contact with one laboring under the disorder will be sure to catch it. Its symptoms are a scurf on the external part of the body, which is always attended with an itching. This the animal shews by having a continual inclination to rub the affected part or parts against any thing she can get at. Some say that it is caused by a kind of animalculæ, which burrow in the skin. It generally attacks those animals which are low in flesh, and have been fed on poor forage.

The first step to effect a cure of this disease, is to gently curry off the scurf, in order that the medicine may have the better effect. After this, the following application is to be rubbed on the parts affected, which may be repeated every three or four days, till a cure is effected; and it seldom requires more than two or three applications:—Flour of sulphur, 1 lb.; spirits of turpentine, half a pint; train oil enough to make it into a thin liquid.

Horn Distemper. This is a disease which has its seat in the horns; cows are more subject to it than oxen, and it does not attack bulls; steers and heifers under three years old, it is said are not subject to it. The distemper causes the pith of the horn to be gradually consumed. It is most commonly confined to one horn only, but sometimes appears in both. It is occasioned by poor keeping, by which the blood becomes thin and reduced, and does not circulate properly in the extremities. It is discovered by the sluggishness of the animal, loss of appetite, coldness of the horn, and disposition to lie down.

To cure the disease, the horn should be bored with a nail gimblet in such a manner as to effect a discharge of the matter, which has become purulent. The hollow part should be well cleansed by vinegar, in which

a portion of salt has been dissolved, to be injected by a syringe. Dr. Dean recommends the injection of a mixture of rum and honey, with myrrh and aloes. Stimulating medicines, such as ginger, spices, &c. have been given; but these are injurious, until the bowels have been evacuated. Laxatives, however, such as sulphur, Glauber's salts, &c., prove serviceable, and after the bowels are evacuated, and the horn well cleansed, good keeping will be necessary to effect the cure.

A writer in the New England Farmer recommends the following mixture to be given to cattle affected with this disease, viz. salt and soot, of each half a pint; black pepper, one table spoonful. Soot is frequently administered, combined with the yolk of eggs. For this disease, spirits of turpentine will be found of essential service, applied freely to the top of the head, along the roots of the horn. It will commonly be found, it is believed that cattle afflicted with the horn distemper, have the end of the tail soft and relaxed. In this case, a small piece of the tail should be cut off; or, which is still better, it may be slit for an inch or two, and pounded garlic inserted, taking care to cover the end of the tail with a rag, to prevent the garlic from falling out.

Udder-ill. This disease primarily arises from an imperfect digestion, occasioned by a morbid state of the stomach. The chyle from which the milk is formed, consequently becomes depraved, and the disease shows itself in the udder, or rather in one of the quarters of the udder, the milk of which will be found to be more or less bloody, according to the extent of the disease. For this, Dr. White recommends the following drench: Barbadoes aloes, half an ounce; common salt, four ounces, ginger, one drachm; water, one quart; anodyne carminitive tincture, two ounces, or as a substitute for this last, one table spoonful of laudanum. This drench having been administered, the animal should be turned to short and sweet grass, where she may have sufficient exercise in getting her food. This will gradually strengthen the stomach, improve the digestion and chylification, and purify the blood. The swollen udder or rather, that quarter of the udder which is affected (for there is seldom more than one affected at a time,) should have the bad milk drawn from it three or four times a day; for by remaining in the quarter, it would irritate and increase the inflammation. The only application necessary for the swollen udder, is neat's foot oil, or olive oil, and when it is considerable, fomentation may also be made use of.

Sore Teats. Some cows are more subject to sore teats than others; they are liable to this complaint at all seasons of the year, particularly such cows as have newly calved. If the teats be afflicted in the summer, they often become ulcerated; and the flies plague and teaze them to such a degree as to render it difficult to milk them. It is a great nuisance at the time of milking, as blood and corruption are liable to pass between the fingers into the milk. The following liniment ought always to be kept in readiness for purposes of this kind:—Take elder ointment and yellow basilicon ointment, of each four ounces; spirit of turpentine, one ounce; mix them well together on a slab.

The cow's teats may be well rubbed with this ointment every night, and morning after milking. If in the summer, and the flies plague them, add one ounce of assafœtida, or aloes, in powder, and dissolve it along with the ointment and wax. This will prevent the flies from teazing the animal.

DISEASES OF SHEEP.

LICE. Cattle that have been half starved during the winter, by being kept on bad hay or straw, in cold, damp situations, are often covered with lice. These may be killed by dusting common Scotch snuff on to those parts where the lice are found; but care should be taken not to apply it where the animal is able to lick it off; or the following lotion may be applied, viz., corrosive sublimate, two drachms; muriatic acid, half an ounce; water, one pound. Clater recommends the following wash:—Stavesacre, (Larkspur, or louse-wort,) half a pound; tobacco, cut small, two ounces; boil in one gallon of urine down to three quarts. With this wash, sponge such parts as are infested by lice; repeat if necessary in five or six days.

## 3.—SHEEP.

The diseases to which sheep are liable in other countries, are quite numerous; but in the United States, but two, according to Chancellor Livingston, are found to prevail to any great extent—the scab, and the staggers or dizziness.

SCAB. This is a common disorder among our sheep. It is so well known as not to need a particular description. Mr. Livingston advises, on its first appearance in a flock, to take out the wool from the part affected, and to apply spirits of turpentine and lard to the place. Should this application not prove efficacious, he advises to separate such sheep as are infected from the more healthy—to cut off the wool as far as the skin feels hard to the finger, wash with soap suds, and rub hard with a shoe brush, so as to cleanse and break the scab. "I always," says he, "keep for this use, a decoction of tobacco, to which I add one third, by measure, of the lye of wood ashes, as much hog's lard as will be dissolved by the lye, a small quantity of tar from the tar bucket, which contains grease, and about one eighth of the whole, by measure, of spirits of turpentine. This liquor is rubbed upon the part infected, and spread at a little distance around it. In three washings, with an interval of three days each, I have never failed, in this way, to effect a cure, when the disorder is only partial.

Clater recommends the following mixture:—Take mercury or quicksilver, 1 lb.; Venice turpentine, half a pound; spirits of turpentine, 2 oz.; work them well together in a marble mortar, until the mercury is thoroughly incorporated, which may be completed in the course of five or six hours; then take four pounds of hog's lard, melt it over a slow fire, and when about as warm as new milk, add to it the quicksilver, and keep it constantly stirring until it grows stiff. One pound of the ointment is sufficient to dress seven sheep for the scab; and if slightly infected, it will suffice for from that number to ten.

The method of using this ointment is as follows:—Divide the wool on the back from the head to the tail, so as to expose the skin, then take a small quantity of the ointment, and rub it well in upon the skin from the head to the tail. Next divide the wool on each side, and rub the remaining part of the ointment well in.

The following preparation has also been found effectual:—Mix one pound of tobacco, one ounce of white arsenic, one pint of oil of turpentine, and six quarts of beef brine, with a small quantity of tar, and boil the

whole till the ingredients become incorporated so as to form a liniment. In applying which, every scab must be broken, and the sheep be well rubbed, that the liquid may penetrate every part. Another efficacious remedy, similar to the one which we have extracted from Clater, was communicated by Sir Joseph Banks to the "Society for the encouragement of Arts, Manufactures, and Commerce," in 1789, from whose transactions for that year we have selected it:—Let one pound of pure quicksilver, Venice turpentine and common oil, of each half a pound, and four pounds of hog's lard, be triturated in a mortar till the quicksilver is thoroughly incorporated with the various ingredients.

In applying this ointment, the head of the sheep must be first rubbed; after which a furrow is to be drawn with the finger, from the region between the ears, along the back to the point of the tail, so as to divide the wool, till the skin be exposed to the touch. Then the finger being dipped into the unguent, must be drawn along the skin; and similar furrows should be made down the shoulders and thighs, and as far as the wool extends; and if the sheep be much infected, two other lines or furrows ought to be drawn parallel to that on the back; and one should also be traced downwards on each side, between the fore and hind legs.

Another application which has been highly recommended is composed of tobacco, lime water, and oil of vitriol, to which we may add from the same authority, "another excellent remedy," viz. a decoction of hellebore, mixed with vinegar, sulphur, and spirits of turpentine.

Staggers or Dizziness. This disorder is found upon dissection to be owing to a bag containing water within the skull, which presses upon the brain. It is generally considered as incurable, though it is said by others that it may be remedied by *trepanning:* a soft place on the head indicates the situation of the bag, which if taken out whole, will remove the disorder; others pass a sharp wire up the nostrils into the brain and perforate the bag; the suppuration which this occasions effects the cure; five out of six, however, die under this operation, and it may therefore be considered as incurable by the doctor.

Pinning and Scouring. Lambs, soon after the birth, are subject to a disorder called pinning. It consists in the excrements being so glutinous as to fix the tail to the vent, which if neglected will often kill the lamb. The remedy is to wash them clean, and rub the buttocks and tail with dry clay, which will prevent any further adhesion. Lambs are also subject to scouring or purging. This generally arises from being kept too cold; sometimes from the quality of the ewe's milk. They should with the parent ewes be put in a warm dry sheltered cot; the ewes should have plenty of nutritious food given them; such as oats, old Indian corn, and wheat bread; care should be taken that they nurse their lambs duly, for, it often happens that this complaint is aggravated from a penury of milk; in which case, the deficiency should be supplied by cow's milk boiled, or by letting the lamb suck a cow.

Tick. The remedies applied in England are solutions of arsenic, or corrosive sublimate, and decoctions of tobacco. The first are dangerous to the operator, and many occasion fatal accidents; the last are hurtful to the sheep if not carefully applied. Chancellor Livingston recommends to take a bellows, to the nozel of which a pipe must be affixed capable of containing a handful of tobacco; (the refuse from the tobacconists will

answer,) set fire to the tobacco, and while one man holds the sheep between his knees, let another open the wool, while a third blows the smoke into the fleece ; close the wool on the smoke, and open another place in a few inches from it, and so go over the whole sheep, blowing also under the belly and between the legs ; in twenty-four hours every tick will be killed. The whole operation may be performed on a sheep in about two minutes.

COLD AND ITS CONSEQUENCES. When sheep are very ill kept, or when they lie on damp or wet ground, they are subject to colds, which appear by the discharge of mucus from the nose and eyes, and sometimes by blindness. The cure is warmth, dry litter, and good food. It will, however, happen that some sheep have at all times this discharge from the nose ; but upon examination, those will generally be found to be old, and should be fatted as soon as possible, as they disfigure a flock, and do not pay for their keeping.

FOOT ROT. This disease is analagous to the grease, the thrush, and the canker of the horse, and the loo or loe, or foul in the foot, in cattle. It is produced by the same cause, and as in the horse and in cattle, it is contagious, so a sheep affected with the foot rot, put into a fold, would be likely to infect the whole flock. This opinion, however, has not been so fully established as to admit of no doubt. The disorder is contagious, but may be produced also by other causes, and especially by feeding on stale grains and bad hay. The only method of curing it is to examine the foot carefully, and pare away every bit of horn under which the disease may have formed. When this is done, (and it is better to pare away too much than too little,) a saturated solution of blue vitriol will always effect a cure, and is sufficiently strong for the very worst cases. It is necessary also to avoid the cause that produces this disorder, by changing the situation of the sheep, and giving them wholesome food.

BRAXY, *Dry Braxy*, *Water Braxy*, *Bowel sickness*. Water Braxy is an inflammatory disorder, which quickly terminates in dropsy of the belly or chest ; dry braxy, is indigestion or obstruction in the first and third stomach, by feeding during winter on dry sapless food, such as the tops of heather, bent and other dry food. The symptoms of the former are quick breathing, hanging the head and ears, loss of appetite and separating from the flock. In the latter there is swelling of the belly and griping pains, which often become violent. Sometimes the animal stands with his feet almost together ; at other times he is seen lying down and rising up almost every minute. The mouth and tongue are dry and parched, and the white of the eye inflamed. In both diseases, bleed freely from the neck vein, and in the latter give one ounce of common salt, in half a pint of water, and a tea spoon full of tincture of opium ; a drachm of powdered aloes may be added, and a little ginger.

CATARRHAL AFFECTIONS, *Hoose*, *Cough*, *Distemper*. This disorder in sheep is similar to that in cattle. It exists in various degrees, but the same remedy is always necessary, that is, bleeding to the extent of one pint. If any medicine is required, it is half an ounce of common salt, or one ounce of Epsom salt dissolved in four ounces of thin gruel. Sheep should never be bled in the nose or ears as is commonly done. There is no difficulty whatever in bleeding sheep in the same manner that bullocks are bled, without cutting off a bit of wool.

POISON. Sheep are often poisoned by eating laurel or ivy, as it is commonly called (not the magnolium.) The symptoms of which are their foaming at the mouth, then vomiting the half masticated leaves and green juice, by which the mouth of the animal is discolored. *Remedy*—Take a gill of sweet oil, hog's lard, or fresh butter; mix it with a pint of new milk. If taken seasonably it will effect a cure. *Or*, an egg given to each of the diseased, in the shape of a natural bolus, by simply breaking the egg and slipping the yolk, and as much white as practicable, down the throat of the animal. The sheep, after swallowing the egg, will vomit up the leaves and green juice, but none of the egg. To cows give four times the quantity.

WOUNDS. Besides the various casualities above specified, sheep are liable to receive injuries from being wounded by thorns, &c. or worried, torn or bitten by mischievous dogs, or such as are not thoroughly broken in. Although such accidents may in general be prevented by due care and attention, yet in cases of common green wounds, it may be necessary to apply some healing or emollient balsam, or salve like the following:—

Let one ounce of myrrh, a similar quantity of Socotrine aloes, and four ounces of purified turpentine, be mixed with a quart of good brandy; the vessel should be corked up and exposed for one or two weeks to a moderate heat, after which, it may be strained off, and preserved for future use in a closely stopped bottle.

Lastly, the shepherd ought frequently to examine his flock, and see that their tails and buttocks be kept perfectly clean, otherwise they will become *tagged* or belted, i. e. the skin will become excoriated and sore from the dung that adheres to those parts, especially when the animals are affected with the flux or white scour. Where this is the case, the sheep must be taken into a dry, separate yard, and well washed with soap suds, the wool around the sores being previously removed; after which, the wounded parts may be strewed with finely pulverized white lead or chalk, and this may be succeeded by rubbing them with a mixture of brandy and tar; but cleanliness alone will be quite sufficient to effect a cure.

## 4.—SWINE.

MEASLES. This disorder exists chiefly in the throat, which is internally filled with small pustules or tumors that sometimes appear on the outward surface of the neck. It is known by the languor and decline in the flesh of the animal affected, and may be removed by giving small quantities of levigated crude antimony in his food. Another prescription for this disease is—take half a spoon full of spirit of hartshorn, and two ounces of bole ammoniac; mix it with meal and water, and give it to the animals affected, in the morning, when they are very hungry.—Repeat the dose every day, till they are cured, which will be in four or five days. Another mode of treatment recommended is to mix two spoon fulls of madder with their food about once a week, which prevents obstructions, acting as a diuretic, and at the same time an astringent. Also on some other day of the week give a spoon full or two of an equal quantity of flour of sulphur and saltpetre, well pounded and mixed.

## DISEASES OF SWINE.

MANGE. This disease, like the scab in sheep, is a cutaneous eruption occasioned by inattention to cleanliness in hog styes. It is easily known by the violent rubbing of swine against trees or any hard substance, with such violence as to tear away the head of pustules, and produce a disagreeable scab. When this disease appears the animal affected must be separated from the rest of the herd, washed thoroughly with a strong soap lye, and anointed with the following unguent recommended by Dr. Norford in the Annals of Agriculture, viz.—Incorporate one ounce of fine flour of sulphur, two drachms of fresh pulverized white hellebore, three ounces of hog's lard, and half an ounce of the water of hali (as prepared in the shops,) so as to form an ointment. This is to be rubbed in at one time, and is said to be sufficient for a beast which weighs six or seven stone. If properly applied, Dr. N. states that no repetition will be necessary, if the hog be kept perfectly clean after the cure is performed. In case there is a slight cough, he directs from half an ounce to an ounce and a half of crude antimony, according to the size of each animal, to be finely pulverized and mixed with his daily food for ten days or a fortnight, when the swine will be perfectly restored. But if, from neglect, the neck, ears, (especially in the large lop eared hogs) or other parts become ulcerated, they should be anointed every third or fourth day with a little tar ointment, prepared by mixing equal parts of mutton suet and tar over a gentle fire, and straining the mixture while hot.

MURRAIN or *Leprosy*. In swine this disease is indicated by shortness and heat of breath, heads hanging down, staggering, and a secretion of viscid matter from the eye. It occurs chiefly in hot seasons, when the blood becomes inflamed. To cure this disease, boil a handful of nettles in a gallon of small beer, then add half a pound of flour of sulphur; a quarter of a pound of pulverized anisseed; three ounces of liquorice, and a quarter of a pound of eleeampane. Give this liquid in a milk at six doses, and keep the animal on wholesome food. The best preventive is to keep swine clean and cool in summer, and allow no carrion or filth whatever to remain near their styes.

DISEASES OF THE LUNGS. These are generally accompanied with a dry husky cough, and wasting of the flesh, occasioned by too great exposure to cold and wet. The best remedy is a dry warm stye, with a regular supply of food that is calculated to keep them cool, and allay the irritation attendant on their cough.

FEVER or *rising of the Lights*. This disease originates from over feeding, and may be removed by administering a mixture of sulphur and oil.

GARGUT. This is an inflammatory affection of the udder or bag, it being distended with coagulated milk, whence the lacteal ducts are obstructed. It is chiefly occasioned by not sucking down in proper time; though too much keep before the time of farrowing will also produce this malady. In slight cases, the udders may be bathed with camphorated spirits of wine, but as the young pigs will never suck their dams when the milk becomes vitiated, there is no alternative but gently to express the corrupted milk, if it can be effected, otherwise it will be best to kill the sow, which must necessarily perish from the inattention above mentioned.

ISSUES. If the issues in the forelegs of swine become stopped, every

attempt to fatten them will be in vain. These therefore, should be watched, and if found to be stopped, they should be rubbed open with a corn cob.

## 5. VETERINARY PHARMACOPEIA.

For the following recipes for veterinary practice we are indebted to Loudon's Encyclopedia of Agriculture, in which we are informed, that they were compiled from the works of those eminent veterinary writers, Blaine, Clark, Lawrence, Peel, White, &c. The recipes for oxen, calves, and sheep have been included in the arrangement. It should be noted, that a large ox will bear the proportions of a moderate sized horse; a moderate sized cow something less. A calf, about a third of the quantity; and a sheep about a quarter, or at most, a third of the proportions directed for the cow. It is also to be remarked, that the degrees of strength in the different recipes are usually regulated by their numbers, the mildest standing first.

### 1. *Alteratives*

1.

Levigated antimony, 2 drachms,
Cream of tartar,
Flour of Sulphur, each half an ounce.

2.

Cream of tartar,
Nitre, of each half an ounce.

3.

Æthop's mineral,
Levigated antimony,
Powdered resin, each 3 drachms.

Give in a mash or in oats and bran, a little wetted, every night, or made into a ball with honey.

### 2: *Tonic Alteratives.*

1.

Gentian,
Aloes,
Ginger,
Blue vitriol, in powder of each one drachm,
Oak bark in powder, 6 drachms.

2.

Winter's bark in powder, three drachms,
Green vitriol, do. one and a half drachms,
Gentian, do. three drachms.

Make either of these into a ball with honey, and give every morning.

3.

White vitriol, one drachm,
Ginger or pimento, ground, two drachms,
Powdered quassia, half an ounce,
Ale, eight ounces.

Mix and give as drink.

4.

Arsenic, 10 grains,
Oatmeal, 1 ounce.

Mix and give in a mash, or moistened oats nightly.

### 3. *Astringent Mixtures for Diarrhœa, Lax, or Scouring.*

1.

Powdered ipecacuana, 1 drachm,
Do. opium, half a drachm,
Prepared chalk, 2 ounces,
Boiled starch, 1 pint.

2.

Suet, 4 ounces, boiled in
Milk, 8 ounces,
Boiled starch, 6 ounces,
Powdered alum, 1 drachm.

The following has been very strongly recommended in some cases for the lax of horses and cattle.

3.

Glauber's salts, 2 ounces,
Epsom do. 1 ounce,
Green vitriol, 4 grains,
Gruel, half a pint.

When the lax or scouring at all approaches to dysentery or molten grease, the following drink should be first given.

4.

Castor oil, 4 ounces,
Glauber's salts, dissolved, 2 ounces,
Powdered rhubarb, half a drachm,
Powdered opium, 4 grains,
Gruel, 1 pint.

3. *Astringent balls for Diabetes or pissing evil.*

Catechu (Japan earth) half an ounce.
Alum powdered, half a drachm,
Sugar of lead, 10 grains.
Conserve of roses, to make a ball.

5. *Astringent paste for thrush, foot rot, foul in the foot, &c.*

Prepared calumine,
Verdigris, of each, half an ounce,
White vitriol,
Alum, of each half a drachm,
Tar, 2 ounces; mix.

6. *Astringent washes for cracks in the heels, wounds, &c.*

1.

Sugar of lead, 2 drachms,
White vitriol, 1 drachm,
Strong infusion of oak or elm bark, 1 pint; mix.

2.

Green vitriol, 1 drachm,
Infusion of galls, half a pint.
Mix, and wash the parts three times a day.

7. *Powder for cracks, &c.*

Prepared calumine, 1 ounce,
Fuller's earth, powdered,
Pipe clay, do. of each 2 ounces.
Mix and put within gauze and dab the moist surfaces of the sores frequently.

8. *Astringent paste for Grease.*

1.

Prepared calumine,
Tutty, powdered,
Charcoal do. of each 2 ounces,
Yeast enough to make a paste.

2.

To the above, if more strength be required, add of alum and verdigris each a drachm.

9. *Astringent wash for do.*

Corrosive sublimate, 2 drachms,
Spirit of wine or brandy, 1 ounce,
Soft water, 10 ounces.
Rub the sublimate in a mortar with the spirit till dissolved, then add the water. This is a strong preparation, and has often proved successful in very bad cases of grease, which have resisted all the usual remedies.

10. *Blisters.*

1.

A general one.
Cantharides powdered, 2 ounces,
Venice turpentine do.
Resin, do.
Palm oil, or lard, 2 lbs.
Melt the three latter articles together, and when not too hot stir in the Spanish flies.

2.

A strong cheap blister, but not proper to be used in fevers or inflammations, as of the lungs, bowels, &c.
Euphorbium, powdered, 1 ounce,
Oil of vitriol, 2 scruples,
Spanish flies, 6 ounces,
Palm oil or lard,
Resin, of each 1 pound,
Oil of turpentine, 3 ounces.
Melt the resin with the lard or palm oil. Having previously mixed the oil of vitriol with an ounce of water gradually, as gradually add this mixture to the melted mass; which again set on a very slow fire for ten minutes more; afterward remove the whole, and when beginning to cool, add the powders previously mixed together.

3.

A mercurial blister for splints, spavins and ring bones.

Of either of the above, 4 ounces,
Corrosive sublimate, finely powdered, half a drachm.

4.

Strong liquid blister.

Spanish flies, in gross powder, one ounce,
Oil of origanum, 2 drachms,
Oil of turpentine, 4 ounces,
Olive oil, 2 ounces.

Steep the flies in the turpentine 3 weeks, strain off, and add the oil.

5.

14. *Mild liquid or sweating blister.*

Of the above, 1 ounce,
Olive oil, or goose grease, one and a half ounces.

15. *Clysters.*

1. A laxative one.

Thin gruel, or broth, 5 quarts,
Epsom, or common salts, 6 ounces.

16. *Clyster for Gripes.*

2.

Mash two moderate sized onions,
Pour over them oil of turpentine, 2 ounces,
Capsicum, or pepper, half an oz.
Thin gruel, 4 quarts.

17. *Nutritious Clyster.*

3.

Thick gruel, three quarts,
Strong sound ale, one quart,

Or, 4.

Strong broth, 2 quarts,
Thickened milk, 2 quarts.

18. *Astringent Clysters.*

5.

Tripe liquor, or suet boiled in milk, 3 pints,
Thick starch, 2 pints,
Laudanum, half an ounce,

Or, 6.

Alum whey, 1 quart.
Boiled starch, 2 quarts.

19. *Cordial Balls.*

Gentian, powdered, 4 ounces,
Ginger, do., 2 ounces,
Coriander seeds, do. 4 ounces,
Caraway do. 4 ounces,
Oil of annisseed, quarter of an oz.

Make into a mass with honey, treacle or lard, and give an ounce and a half for a dose.

20. *Chronic Cough Balls.*

1.

Calomel, one scruple,
Gum ammoniacum,
Horse radish, of each 2 drachms,
Balsam of Tolu,
Squills, each one drachm.

Beat all together, and make into a ball with honey, and give every morning, fasting.

21. *Drink for the same.*

2.

Tar water,
Lime water, of each half a pint,
Tincture of squills, half an ounce.

22. *Powder for the same.*

3.

Tartar emetic, 2 drachms,
Powdered foxglove, half a drachm,
Powdered squill, half a drachm,
Calomel, one scruple,
Nitre, 3 drachms.

Give every night in a malt mash.

23. *Diuretic Balls.*

Resin, yellow, 1 pound,
Nitre, half a pound,
Horse turpentine, half a pound,
Yellow soap, quarter of a pound.

Melt the resin, soap, and turpentine over a slow fire; when cooling, add the nitre. For a strong dose, an ounce and a half, for a mild one, an ounce. It should be kept in mind, that mild diuretics are always equal to what is required; and that strong diuretics are always hurtful.

24. *Diuretic Powders.*

Yellow resin, powdered, 4 oz.
Nitre, do. 8 ounces,
Cream of tartar, do. 4 ounces.

Dose—6, 8, or 10 drs. nightly.

which some horses will readily eat in a mash.

25. *Urine drink.*
Glauber's salts, two ounces,
Nitre, 6 drachms.

Dissolve in a pint of warm water.

26. *Embrocations—cooling for inflammations.*
1.
Goulard's extract, half an ounce,
Spirit of wine or brandy, 1 ounce,
Soft water, 1 quart.
2.
Mindererus spirit, 4 ounces,
Water, 12 ounces.

27. *For Strains.*
Bay salt, bruised, half a pound,
Crude sal ammoniac, 2 ounces,
Sugar of lead, quarter of an ounce,
Vinegar, one pint and a half,
Water, one pint.

28. *For the Eyes.*
1.
Sugar of lead, one drachm,
White vitriol, 2 scruples,
Water, 1 pint.
2.
Brandy, 1 ounce,
Infusion of green tea, 4 ounces,
Tincture of opium, 2 drachms,
Infusion of red roses, 4 ounces.
3.
Rose water, 6 ounces,
Mindererus spirit, 3 ounces.
4.
Corrosive sublimate, 4 grains,
Alcohol, 1 ounce,
Lime water, 1 pint.
5.
Alum, powdered, 1 drachm,
Calomel, half a drachm.

Mix and insert a little at one corner of the eye. The custom of blowing it in, alarms the horse.

29. *Fever Powders.*
1.
Tartar emetic, 2 drachms,
Nitre, 5 drachms.
2.
Antimonial powder, 2 drachms,
Cream of tartar,
Nitre, of each four drachms.

30. *Fever Drink.*
3.
Sweet spirit of nitre, 1 ounce,
Mindererus spirit, 6 ounces,
Water, 4 ounces.

31. *Epidemic Fever Drink.*
4.
Sweet spirit of nitre, 1 ounce,
Simple oxymel, 6 ounces,
Tartar emetic, 3 drachms.

32. *Malignant Epidemic Fever.*
5.
Simple oxymel,
Mindererus spirit,
Beer yeast, of each 4 ounces,
Sweet spirit of nitre, 1 ounce.

33. *Fumigation for purifying infected stables, sheds, &c.*
Manganese, 2 ounces,
Common salt, do.
Oil of vitriol, 3 ounces,
Water, 1 ounce.

Put the mixed manganese and salt into a basin; then, having before mixed the vitriol and water very gradually, pour them by means of tongs, or any thing that will enable you to stand at a sufficient distance, on the articles in the basin gradually. As soon as the fumes rise, retire and shut up the door close.

34. *Hoof Liquid.*
Oil of turpentine, 4 ounces,
Tar, 4 ounces,
Whale oil, 8 ounces.

This softens and toughens the hoofs extremely, when brushed over them night and morning.

35. *Purging Medicines.*
Balls—very mild.
Aloes, powdered, 6 drachms,
Oil of turpentine, 1 drachm.

Mild.

Aloes, powdered, 8 drachms,
Oil of turpentine, 1 drachm,

Strong.

Aloes, powdered, 10 drachms,
Oil of turpentine, 1 drachm.

The aloes may be beaten with treacle to a mass, adding, during the beating, the oil of turpentine. All spices, cream of tartar, oil of tartar, jalap, &c. are useless, and often hurtful additions.

36. *Liquid Purge.*

Epsom salts, dissolved, 8 ozs.
Castor oil, 4 ozs.
Watery tincture of aloes, 8 ozs.

Mix—the watery tincture of aloes is made by beating powdered aloes with the yolk of eggs, adding water by degrees; by these means, half an ounce of aloes may be suspended in 8 ounces of water, and such a purge is useful when a ball cannot be got down, as in partial locked jaw.

37. *Scalding Mixture for Poll Evil.*

Corrosive sublimate, finely powdered, 1 drachm,
Yellow basilicon, 4 ounces.

38. *Foot Stoppings.*

Horse and cow dung, each about 2 pounds. Tar, half a pound.

39. *Wash for coring out, destroying fungus, or proud flesh, &c. &c.*

Lunar caustic, 1 drachm.
Water, 2 ozs.

40. *Wash for Mange.*

Corrosive sublimate, 2 drachms,
Spirit of wine or brandy, 1 oz.
Decoction of tobacco,
Do. of white hellebore, of each 1 pint.

Dissolve the mercury in the spirit and then add the decoctions.

41. *Ointments for Healing.*

1.

Turner's cerate, 2 ozs.
White vitriol, powdered, half a drachm,
Lard, 4 ozs.

42. *For Digesting.*

2.

Turner's cerate, 3 ozs.
White vitriol, 1 drachm,
Yellow basilicon, 5 ozs.

43. *For Mange.*

Sulphur vivum, 8 ozs.
Arsenic in powder, 2 drachms,
Mercurial ointment, 2 ozs.
Turpentine, 2 ozs.
Lard, 8 ozs.

Mix, and dress with every morning.

44. *For Scab, or Shab, in Sheep; Mallenders and Sellenders in Horses, and foul blotches and eruptions in cattle in general.*

Camphor, 1 drachm,
Sugar of lead, half a drachm.
Mercurial ointment, 1 ounce.

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## OBSERVATIONS ON THE WEATHER.

"Innumerable advantages would arise to the husbandman," remarks Dr. Dean, "from a foreknowledge of the changes of the weather; and even from a foreknowledge of the general characters of the approaching seasons. In the former case, he would be able to order his business from day to day in the best manner, and so prevent much hurry, perplexity and loss; especially in the season of hay making and harvesting; in the latter, he would be happily directed in his choice of crops, and the best method of cultivating them. But, as this know-

ledge is not to be obtained, the ability to make very probable conjectures is nextly to be coveted, as it will be found to answer very valuable purposes."

Among the various phenonema which attentive observers have found to indicate approaching changes in the atmosphere, the following, chiefly from the complete Grazier, are selected as affording the most certain signs:

I. *By animals.* Previous to rain and wind, or stormy weather, neat cattle and sheep seem more than usually desirous of feeding in their pastures, and to leave them with reluctance. A similar change is announced by the uneasiness of swine, which grunt loudly, and retire to their styes; by geese and ducks washing themselves repeatedly and with little intermission, flying anxiously backwards and forwards; by swallows flying low and skimming along the surface of the water, twittering with more loudness than usual; and by poultry rolling much in dust and sand or gravel. Wet and windy weather is likewise indicated by dogs becoming drowsy and stupid, and exhibiting an evident reluctance for food, except grass, (particularly the species denominated dog's grass, or couch grass;) and by cats losing their vivacity, and remaining within doors. Continued rain is announced by pigeons returning slowly to their cotes; a change from cloudy or unsettled to greater wet, by flies stinging and swarming more than usual; and a sudden variation, accompanied with a storm, by wild ducks, plovers, bustards, and other aquatic birds withdrawing to the sea coast or to the marshes.

The contrary circumstances evince the longer or shorter continuance of fine weather: to which may be added, that bees flying abroad, and laboring with that industry which has become proverbial; crows croaking in the morning; the robin or red breast singing early from the more elevated branches of trees; and gnats flying in a columnar form within the rays of the setting sun, are all indications of fine or serene weather.

II. *From the appearance of the earth.* Thus moist stones and dry soil prognosticate rain; a continued fall of which may be expected, if the ground seem nearly dry, and the roads almost if not wholly free from mud; as the contrary occurrences announce that the evaporation of humidity has ceased, and consequently that fine weather is approaching.

III. *From the atmosphere.* If in the evening a white mist be spread over a meadow contiguous to a river, and be evaporated by the sun's rays on the following morning, it is an indication of fine weather throughout the day; so in the morning, if a mist, which is impending over low lands, draw off towards those which are more elevated, it announces a fine day. The gradual diminution of clouds till they can no longer be seen in the air, is a sign of fair weather; so likewise is the continuance of abundant dew apon the grass after a serene day. The contrary events announce a change of weather, which may be more clearly known by the clouds gathering and lowering; by the sky, after serene weather becoming undulated, as it were, with small clouds.

The indications of approaching changes of the weather from the form of the clouds, have been much insisted upon by some writers. These indications are far from being infallible, yet experience and observation justify certain deductions in respect to the coming weather, which may

OBSERVATIONS ON THE WEATHER.

be of some value to the farmer. Although the forms of clouds are greatly diversified, they may all be comprised in seven modifications, as follows:

Cirrus, or *Curl Cloud.*
Cirrocumulus or *Sondor Cloud.*
Cirrostratus or *Wane Cloud.*
Cumulostratus or *Twain Cloud.*
Cumulus or *Stacken Cloud.*
Nimbus or *Rain Cloud.*
Stratus or *Fall Cloud.*

These clouds are represented in the following engraving.

Fig. 1.
Fig. 2.
4.
2.
5.
6.
9.
7.
8.
10.
11.

*Obs.* 1. The cirrus or *curl cloud,* Fig. 1, derives its name from its *curling* form, which often assumes the appearance of a bunch of wool drawn out into fine pointed ends. A variety of this cloud is known by farmers under the name of *mare's tail,* and is an accompaniment of variable weather, and prognosticates wind and rain.

2. The Cirrocumulus or *sonder cloud,* Fig. 2, consists of beds of small, well defined masses of clouds which lie in the neighborhood of each other, yet are separated from each other and distinct, as the word *sonder* or *sunder* indicates. The prevalence of this cloud in summer forebodes a higher temperature; in winter, it indicates warm and wet weather. When these clouds are very dense, and quite round in their form, they are a forerunner of storms.

3. Cirrostratus or *wane cloud.* The prevalence of this cloud is almost always followed by rain or snow. It derives its name from the frequent change which it undergoes in its appearance. Figs. 3, 4, 5, 6, 7, represent the varieties of this cloud.

4. Cumulostratus and Cumulus are represented by Fig. 9, the Cumulus having the appearance of a *heap* or *stack* of clouds, and the Cumulostratus being the base or foundation of the Cumulus. It is called *twain cloud* from the frequent coalescense or juncture of two other modifications or clouds, as the cirrus and the cumulus. The cumulostratus is an indication of rain or snow; but if it ends in either, it previously assumes the form of Nimbus, as in Fig. 11.

5. Nimbus, Fig. 11, is always followed by either snow or rain.

# PART VI.

## ART OF GARDENING OR HORTICULTURE.

### ON THE SITUATION, SOIL, FENCING, AND LAYING OUT OF GARDENS.

Situation. The ground should be as nearly on a level as possible; but as it is not always in our power to choose a level spot, the slope in the ground should, if possible, be towards the *South.* In a Kitchen Garden all *large trees* ought to be kept at the distance of thirty or forty feet. For, the *shade* of them is injurious, and their *roots* a great deal more injurious to every plant growing within the influence of those roots. *Grass,* which mats the ground over with its roots and does not demand much food from any depth, does not suffer much from the roots of trees; but every other plant does. A kitchen garden should, therefore, have no large trees near it. If it be practicable, without sacrificing too much in other respects, to make a garden near to running water, and especially to water that may be turned into the garden, such an advantage ought not to be lost; but as to *watering* with a *watering pot,* it is seldom of much use, and it cannot be practised upon a large scale. It is better to trust to judicious tillage, and to the dews and rains. A man will *raise* more moisture, with a hoe or a spade, in a day, than

he can *pour* on the earth out of a watering pot in the same time; or, at least to greater purpose.

SOIL. The plants which grow in a garden, prefer, like most other plants, the best soil that is to be found. The best is loam of several feet deep, with a bed of lime-stone, or sand below. Oak trees love clay, and the finest and heaviest wheat grows in land with a bottom of clay; but if there be clay within even six feet of the surface there will be a *coldness* in the land, which will, in spite of all you can do, keep your spring crop a week or ten days behind those upon land which has not a bottom of clay.

Having fixed upon a spot for a garden, the next thing is to *prepare the ground.* This may be done by ploughing and harrowing, until the ground at top be perfectly clean; and then by *double* ploughing; that is to say, by going with a strong plough, that turns a large furrow, and turns it cleanly, twice in the same place, and thus moving the ground to the depth of fourteen or sixteen inches, for the advantage of deeply moving the ground is very great indeed. When this has been done in one direction, it ought to be done across, and then the ground will have been well and deeply moved.

This is as much as I shall, probably, be able to persuade any body to do in the way of preparing the ground. But this is not all that ought to be done; and it is proper to give directions for the *best* way of doing this and every thing else. The best way is, then, to *trench* the ground; which is performed in this manner. At one end of the piece of ground, intended for the garden, you make with a spade, a trench, all along, two feet wide and two feet deep. You throw the earth out on the side away from the garden that is to be. You shovel out the bottom clean, and make the sides of the trench as nearly perpendicular as possible. You then take another piece, all along, two feet wide, and put the earth that this new piece contains into the trench, taking off the top of the new two feet wide, and turning that top down into the bottom of the trench, and then taking the remainder of the earth of the new two feet and place it on the top of the earth just turned into the bottom of the trench. Thus proceed, till the whole of your garden ground be trenched; and it will have been *cleanly turned over to the depth of two feet.*

There is no point of greater importance than this. Poor ground deeply moved is preferable, in many cases, to rich ground with shallow tillage; and when the ground has been deeply moved *once*, it feels the benefit forever after. It is well known to all who have had experience on the subject, that of two plants of almost any kind that stand for the space of three months in top soil of the same quality, one being on ground deeply moved, and the other on ground moved no deeper than is usual, the former will exceed the latter one half in bulk. And, as to *trees* of all descriptions, from the pear tree down to the currant bush, a similar difference might be seen. It is a notion with some persons, that it is no use to move the ground deeper than the roots of the plant penetrate. But, in the first place the roots go much deeper than we generally suppose. When we pull up a cabbage, for instance, we *see* no roots more than a foot long, but if we were carefully to pursue the roots to their utmost point, even as far as the eye would assist us, we should find the roots a great deal longer, and the *extremities* of the

roots are much too fine to be seen with the *naked eye*. Upon pulling up a common turnip, who would imagine that the side or horizontal roots extend to *several feet?* Yet they may be traced to the length of *four feet*. But, though the roots should not extend nearly to the bottom of the moved ground, the plants are affected by the unmoved ground near at hand. Plants require a communication with, and an assistance from, beneath, as well as from above, in order to give them vigor and fecundity.

Thus will the *ground be prepared*, but it seems necessary to add a few words on the subject of *manures*, as adapted to a garden. It is generally thought, and truly, that dung of any sort, is not what ought to be used, in the raising of garden vegetables. It is very certain that they are *coarse and gross*, when produced with the aid of that sort of manure, compared with what they are when raised with the aid of *ashes, lime, rags, and composts*. And besides, dung in hot soils and hot climates, adds to the heat; while ashes, lime, rags, and composts do not. but on the contrary, they attract and cause the earth to retain moisture, All the ground in a garden ought *always* to be good; and it will be kept in this state if it be well manured once every year.

FENCING. The fence of a garden is an important matter; for we have to view it not only as giving protection against *intruders*, two-legged as well as four-legged, but as affording *shelter* in cold weather, and *shade* in hot. With regard to *shelter;* this is of very great consequence, for it is well known that of the south side of a good high fence, you can have peas, lettuce, radishes, and many other things full ten days earlier in the spring than you could have them in the unsheltered ground. The *shade*, during the summer, is also valuable. Peas will thrive in the shade long after they will no longer produce in the sun. Currant trees and gooseberry trees will not do well in this climate, unless they be in the shade. Raspberries are also best in the shade; and during the heat of summer, lettuce, radishes and many other things thrive best in the shade. It will be presently seen, when I come to speak of the form of a garden, that I have fixed on an *oblong square*, twice as long as it is wide. This gives me a long fence on the north side, and also on the south side. The former gives me a fine, warm, extensive border in the spring, and the latter a border equally extensive, and as cool as I can get it, in the heat of summer.

I am aware of the difficulty of overcoming long habit, and of introducing any thing that is new. Yet, amongst a sensible people, such as those for whom this work is intended, one need not be afraid of ultimate success; and I, above all men, ought not to entertain such fear, after what I have seen with regard to the ruta baga. Yet I proceed with hesitation to propose, even for a garden, a *line fence*. In England it is called a *quick set hedge*. The truth is, however, that it ought rather to be called an *everlasting hedge;* for it is not so quickly set, or, at least, so very quickly raised. The plants are those of the white thorn. It bears white flowers in great abundance, of a very fragrant smell, which are succeeded by a little red berry. Within the red pulp is a small stone; and this stone, being put in the ground, produces a plant or tree in the same manner a cherry stone does. The red berries are called haws, whence this thorn is sometimes called hawthorn.

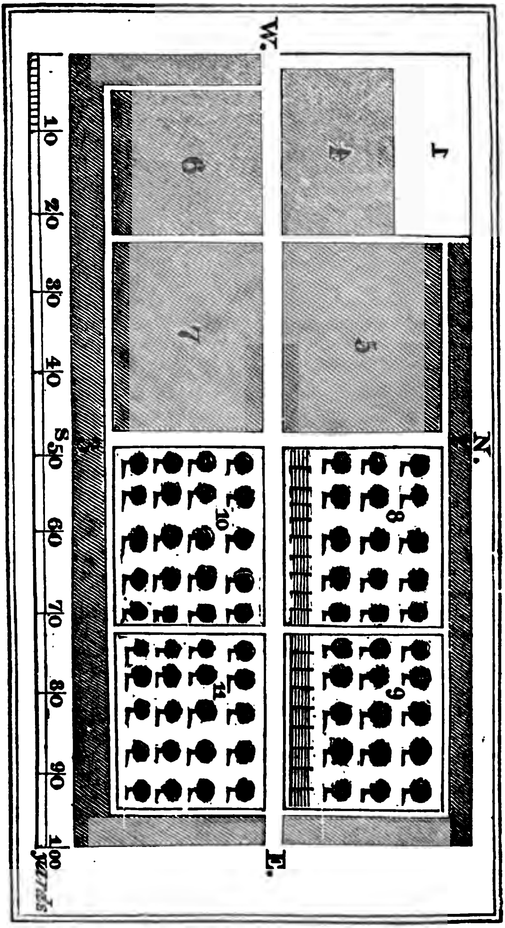
The haws are sown in drills, like peas, and they are taken from that situation, and planted very thick in rows, in a nursery, where they stand a year or two, if they are not wanted the first year. Then they are ready to be planted to become a hedge.

The ground for the garden being prepared, in the manner described, under the head of Soil, take up your plants, prune their roots to within four inches of the part that was at the top of the ground, taking care to cut away all the fibres. Work the ground well all around the edges of the piece intended for the garden, and make it very fine with a spade. Then place *a line along very truly;* for, observe you are planting for generations to come. Take the spade, put the edge of it against the line, drive it down eight or ten inches deep; pull the eye of the spade towards you, and thus you make all along a little open cut to receive the roots of the plant, which you will then put it into the cut, *very upright,* and then put the earth against them with your hand; taking care not to plant them deeper in the ground, than they stood before you took them from the nursery. The distance between the plants is *twelve inches.* When this line is done, plant another line all along by the side of it, and *at six inches from it,* in exactly the same manner; taking care, in this second line, to place the plants opposite the *middles of the intervals.* When both lines are planted, tread gently between them, and also on the outside of them.

This work should be done in the *first or second week of October.* But if you cannot do it in the fall, do it the moment the ground is fit in the spring. In both cases, *the plants must be cut down close to the ground.* If you plant in the fall, cut them down as soon as the frost is out of the ground in the spring, and *before the buds begin to swell;* and, if you plant in the spring, cut down as soon as you have planted. This operation is of *indispensable necessity;* for, without it, you will have no hedge. Keep the ground between them and all around them *very clean, and frequently* hoed. Some people cut down again the next spring; but this is not the best way. Let the plants stand two summers and three winters, and cut them all close down to the ground as you can in the spring, and the shoots will come out so thick and so strong, that you never need cut down any more. But you must this year begin to clip. About the middle of July, you must clip off the top a little, and the sides near the top, leaving the bottom not much clipped, so that the sides of the hedge may slope like the sides of a pyramid. The hedge will shoot again immediately, and will have shoots, perhaps six inches long, by October. Then, before winter, you must clip it again, not cutting down to your last cut, but keeping your side always in a pyramidical slope, so that the hedge may always be wide at bottom and sharp at the top. And thus the hedge will go on, getting higher and higher, and wider and wider, till you have it at the height and thickness that you wish, and when it arrives at that point, there you may keep it. A hedge five clear feet high may be got in *six years* from the day of planting.

Laying out. The laying out of a garden consists in the division of it into several parts, and in the allotting of those several parts to the several purposes for which a garden is made. These parts consist of *Walks, Paths, Plats, Borders, and a Hot Bed Ground.* To render the directions more clear, a plan of the proposed garden is here given.

HORTICULTURE.



## LAYING OUT.

This is not, strictly speaking, a plan, because it exhibits trees in elevation, but it will answer the purpose. The length of the garden is 100 yards, the breadth 50 yards. Before, however, I proceed further, let me give my reasons for choosing an *oblong square*. It will be seen that the length of my garden is from East to West. By leaving a greater

length in this direction, than from North to South, three important advantages are secured, *First*, we get a *long* and *warm* border under the North fence, for the rearing of things early in the spring. *Second*, we get a *long* and *cool* border under the South fence, for *shading* during the great heats, things to which a burning sun is injurious. *Third*, by the shape of the area of the garden, a large portion of the whole is sheltered during winter and spring, from the bleak winds.

Having such a spot before us, little difficulty can arise in laying it out. Indeed it is only necessary to state the dimensions. The several parts are distinguished by numbers. The long walk running from East to West, is *six feet* wide, as is also the cross walk, in the middle. All the paths are *three feet* wide. The borders, No. 2 and 3, are *nine feet* wide. The dimensions of the Plats, Nos. 5, 7, 8, 9, 10 and 11, are each 70 feet from East to West, and 56 from North to South. Plat No. 6, is 56 feet by 50. Plat No. 4 is 50 by 36. The hot bed ground, No. 1, is 70 by 36. I leave trifling fractions unnoticed. It will be seen that about a *third* part of the ground is appropriated to *fruit trees*. The reason for this, and the uses of the other parts of the ground, will be fully stated under the head *Cultivation*.

Hot Beds. The materials of which the bed is to be composed, and the manner of preparing those materials, are first to be spoken of. Dung of horses, cattle, sheep, or pigs is used to make the bed. Either may be made to do, with a greater or less degree of care and trouble; but the best possible thing is *dung* from the stable, taken away before it has been rotted, short and long promiscuously, but rather *long* than *short*. In making the bed, you will proceed as directed below, but I must first describe the frame and the lights. As there are few American farmers who are not able to make both with their own hands, it will be necessary for me merely to say, that the frame is of the best shape when it is eighteen inches deep at the back, and nine inches deep at the front. This will give slope enough. The frame is the wood work on which the lights of glass work are laid. And as it is useless to make a hot bed without a frame and lights ready, I shall suppose them prepared. I suppose a three light frame, four feet wide, and nine feet long, which will of course make every light three feet wide and four feet long, because the long way of the light fits the cross way of the frame.

*Of making the bed.* The front of the bed is, of course, to be full south, so that the noon sun may come right upon the glass. The length and width of the bed must be those of the frame; therefore take the frame and place it upon the spot you mean the bed to stand on. Make a mark in the ground all round the outside of the frame. Then take some sharp pointed straight stakes and drive them into the ground at each corner of the marked out place for the bed, and one or two on the back and front side. Let these be about four feet high. Thus all being ready, begin taking the dung on the side of your heap nearest the spot where you are building the bed. Take long and short fairly, and mix them as you put them in. Shake the stuff in such a way as not to leave any lumps. Let the bed rise in all parts together, as nearly as possible. Beat the whole down with a fork as you proceed. When you have shaken on dung to the thickness of four or five inches, beat all over well again; and so on till the work be finished. But mind, you must be very careful to keep the *edges* of the bed well beaten, else they will sink

more than the rest, and thus the earth on the bed will crack in the middle. At last shovel and sweep up all the short earthy stuff round the bed where your dung heap was, and lay it very smoothly on the top of the bed; and make all as smooth and level as a die with the back of your shovel. Thus *the bed is made.* Then put on the frame, and the lights upon the frame. If you finish your bed by noon, *the heat* will begin to rise by the next morning, and by noon of the second day, the heat will be up. Poke your finger as deep as you can into the middle of the bed; if the heat be so great that you cannot endure it, then it is too great to receive the earth; but if not, put on the earth all over the bed. If the heat be too great, give the bed a little air, and wait till a little of the heat be gone off. The earth should be dry, not like dust, but not *wet.* I made provision for my bed, by putting earth in my cellar in November. The bed is to be covered all over, about *six inches deep.* When the earth has been on twenty-four hours, take off the lights, and stir the earth well with your hands. When you have stirred the earth well, and made the earth level and smooth, *sow your seed,* if you do not find the earth too hot.

*Of the act of sowing.* The more *handsomely* this is done, the *better* it is done. A handsome dress is better than an ugly one, not because it is warmer or cooler, but because, liking it better, we *take more care of it.* Those who have seen two or three women together, crossing dirty streets, or in danger from horses and carriages, cannot have failed to discover, that humanity, like smoke, is very apt to fly to the fairest.

Seeds are great *tell-tales;* for, when they come up, we discover all the carelessness that may have prevailed at the sowing of them.

*Of the management of a hot bed.* Observe that the main principle is, *always to give the plants as much air as they will endure.* I suppose the hot bed made as above, to be four feet high when just finished. It will sink as it heats, and will, at last, come to about one foot and a half. Its heat will gradually diminish; but it will give a great heat for about six weeks, and some heat for four months. It is this bottom heat that makes things grow. The sun is often hot in May; but it is not till the *earth* is warm, that vegetation advances with rapidity. Having secured the bottom heat, make free with the air. Even before the seeds begin to appear, give air to the bed every day, unless it be *very cold* weather. When the plants come up, they will soon tell you all about air; for if they have not enough, they will draw up long legged, and will have small seed leaves, and, indeed, if too much deprived of air, will droop and die. Take care in time to prevent this. Let them grow *strong* rather than *tall.* Short stems, broad seed leaves, very green, these are the signs of good plants and proper management. It will be necessary to *water.* Take off a light at a time, and water with a watering pot, that does not pour out heavily. Water just about sun set, and then shut down the light; and the heat will then rise, and make the plants grow rapidly. Of the management of the different sorts of plants in a hot bed, I shall speak under their respective names.

On Propagation and Cultivation. In order to have good vegetables, herbs and fruits, we must be careful and diligent in the propagation and cultivation of the several plants; for, though nature does much, she does not do all. The propagation of plants is the bringing of them forth,

or the increasing or multiplying of them. This is effected in several different ways; by *seeds*, by *suckers*, by *offsetts*, by *layers*, by *cuttings*. Cultivation must of course differ in some respects, to suit itself to certain differences in the plants to be cultivated; but there are some principles and rules which apply to the cultivation of all plants; and it is of these only that I propose to speak.

*Sort of seed.* We should make *sure* here; for, what a loss to have late cabbages instead of early ones. As to beans, peas, and many other things, there cannot easily be mistake or deception. But as to cabbages, cauliflowers, turnips, radishes, lettuces, onions, leeks, and numerous others, the eye is no guide at all. If, therefore, you do not save your own seed, you ought to be very careful of whom you purchase.

*True seed.* But besides the *kind*, there is the *genuineness* to be considered. For instance, you want sugar-loaf cabbage. The seed you sow may be cabbage; it may too, be sugar-loaf, or more that than any thing else, but, still, it may not be *true* to its kind. To insure *truth* in seed, if you purchase, take the precaution recommended above. But when you find that you have any true seed of any kind, get as much more of it as will last you for the number of years that such seed will keep; and to know how many years the seeds of vegetables and herbs will keep, see under the head of *Saving and preserving Seed.*

*Soundness of Seed.* Seed may be of the right sort; it may be true to its sort; and, yet, if it be unsound, it will not grow. The way to try seed, is this. Put a small quantity of it into *luke-warm* water, and let the water be four or five inches deep. Some seeds, such as those of cabbage, radish, and turnip, will, if good, go to the bottom at once. Cucumber, melon, lettuce, and many others, require a few minutes. Parsnips, and carrots, and all the *winged* seeds, require to be worked by your finger in a little water, before you put them into the glass; and the carrot should be *rubbed*, so as to get off part of the hairs. Though there are other methods, I incline to the opinion that we should try seeds, as our ancestors tried witches, not by fire but by water.

*Saving and preserving Seed.* This is the most important part of the gardener's business. There are rules applicable to particular plants; but it is my business here to speak of such as are applicable to *all* plants. The *truest* plants should be selected, that is, such as are of the most perfect shape and quality. In the cabbage, we seek small stem, well formed loaf, few spare or loose leaves; in the turnip, large bulb, small neck, slender stalk leaves, solid flesh, or pulp; in the radish, high color, if red or scarlet, small neck, few and short leaves, and long top. Of plants, the early coming of which is a circumstance of importance, the very earliest should be chosen for seed; for they will almost always be found to include the highest degree of perfection in other respects. They should be carefully cultivated, during the time they are carrying on their seed to perfection. But effectual care must be taken to prevent a mixing of the sorts. The plants should stand till perfectly *ripe*, if possible. They should be cut, or gathered, when it is dry; and they should, if possible, be as dry as dry can be, before they are threshed out. If, when threshed, any moisture remain about them, they should be placed in the sun; and when quite dry, should be put up into bags, and hung up against a very dry wall, where they will, by no-

accident, get damp. Thus preserved, kept from the open air, and from damp, the seeds of vegetables will keep sound and good for sowing, for the number of years stated in the following list.

| | Years. | | Years. |
|---|---|---|---|
| Asparagus | 4 | Lettuce | 3 |
| Balm | 2 | Mangel Wurtzel | 10 |
| Bean | 1 | Melon | 10 |
| Bean, Kidney, | 1 | Mint | 4 |
| Beet | 10 | Mustard | 4 |
| Brocoli | 4 | Onion | 2 |
| Cabbage | 4 | Parsley | 6 |
| Camomile | 2 | Parsnip | 1 |
| Caraway | 4 | Pea | 1 |
| Carrot | 1 | Pennyroyal | 2 |
| Cauliflower | 4 | Potato | 3 |
| Celery | 10 | Pumpkin | 10 |
| Corn | 3 | Radish | 2 |
| Coriander | 3 | Rhubarb | 1 |
| Cress | 2 | Rosemary | 3 |
| Cucumber | 10 | Ruta Baga | 4 |
| Fennel | 5 | Savory | 2 |
| Garlic | 3 | Spinach | 4 |
| Hop | 2 | Squash | 10 |
| Horse radish | 4 | Tansy | 3 |
| Hyssop | 6 | Thyme | 2 |
| Lavender | 2 | Turnip | 4 |
| Leek | 2 | | |

*Sowing.* The first thing relating to sowing, is the preparation of the ground. It may be more or less *fine*, according to the sort of seed to be sown; but still the finer the better for every thing; for it is best if the seed be actually *pressed* by the earth in every part. Of course, the ground should be good, either in itself, or made good by manure of some sort. But in all cases, the ground should be fresh; that is, it should be dug just before the act of sowing, in order that the seeds may have the full benefit of the *fermentation* that takes place upon every moving of the earth. Never sow when the ground is wet. If you dig ground in wet weather, you make a sort of mortar of it; it binds when the sun or wind dries it. The fermentation does not take place. Sow, therefore, if possible, in dry weather, but in freshly moved ground. The *season* for sowing, will of course, find a place under the name of the respective plants. However, it is necessary to observe, that some, and even many things, which are usually sown in the spring, would be better sown in the fall. Parsnips, carrots, beets, onions, and many other things may be safely sown in the fall. The seed will not perish, if covered by the earth. But then, care must be taken to sow early enough in the fall for the plants to come up before the frost sets in.—Even early peas would be best sown in the fall, could you have an insurance against mice.

*Transplanting.* The weather for transplanting, whether of table vegetables or of trees, is the same as that of sowing. If you do this work

in wet weather, or when the ground is wet, the work cannot be well done. It has been observed, as to seeds, that they like the earth to touch them in every part, and to lie close about them. It is the same with roots The earth should be as firm as possible, for if it be not, part of the roots will remain untouched by the earth. If ground be *wet*, it cannot be *firm*. And, if mixed wet, it will remain a sort of mortar, and will cling and bind together, and will leave more or less of cracks, when it comes to dry. If possible, therefore, transplant when the ground is not wet; but here, as in the case of sowing, let it be deeply moved and well broken, immediately before you transplant into it.

CULTIVATION. Here, as under the foregoing head, I propose to speak only of what is of general application, in order to save the room that would be necessary to repeat instructions for cultivation under the names of several plants. The ground being good, and the sowing or planting having been properly performed, the next thing is the *after management*, which is usually called the *cultivation*. If the subjects be from seed, let them be *thinned* early, because, if left close, they cannot come to good. Carrots, parsnips, lettuces, every thing, ought to be thinned in the seed leaf. Hoe, or weed, immediately, and let me observe here, once for all, that weeds ought never to be suffered to get to any size, either in the field or garden. But, besides the act of killing weeds, *cultivation* means moving the earth between the plants while growing. This assists them in their growth; it feeds upon them; it raises food for their roots to live on. A mere flat hoeing does nothing but keep down the weeds. The hoeing when the plants become stout, should be deep; and in general with a hoe that has prongs, instead of a mere flat plate; *deep hoeing* is enough in some cases; in others, *digging* is necessary to produce a fine and full crop. If any body will have a piece of cabbages, and will dig between the rows of one half of them twice during the growth, and let the other have nothing but a flat hoeing, that person will find that the half which has been digged between, will, when the crop is ripe, weigh nearly, if not twice as much as the other half. It may appear that to dig thus amongst growing plants, is to cut off their roots, of which the ground is full. This is really the case, and this does great good; for the roots thus cut asunder, shoot again from the plant side, find new food, and send instantly, fresh vigor to the plant. The effect of this tillage is quite surprising.

Having given some direction as to propagation and cultivation in general, I next proceed to give alphabetical lists of the several sorts of plants, and to speak of the proper treatment of each.

ASPARAGUS. It is propagated from the seed. Gather the seed when it is dead ripe. Sow it thinly in drills, a foot asunder, and two inches deep, three weeks, or about, before the frost sets in. Dress the earth well down upon the seed, and as soon as the frost sets in, cover the ground with muck, or litter, a foot deep. As soon as the frost breaks up in the spring, take off the litter, and you will have the plants quickly up. When the plants are fairly up, thin them to four inches asunder. Keep them clean, and hoe deeply between them in summer; and when the haulm is *yellow* in the fall, cut them off near, or close to the ground, but let the haulm be quite dead first, yet do it not before the

frost actually sets in. When you have cut off the haulm, lay some litter upon the bed until spring, to prevent the frost from being too long coming out of the ground in the spring. When the frost breaks up, throw some wood ashes, or some other manure, about an inch deep, over the bed, having first loosened the top of the bed with a fork; upon this manure throw earth over the bed, out of the paths, three inches thick, and break it very fine at the time. In the fall, cut down the haulm again as before, repeat the winter operation of littering; and in the spring again fork up, put on ashes, or good mould, and dress it with three inches more earth. *This year*, if your work have all been well done, you may have some asparagus to eat. The next fall, and every succeeding fall, cut down the haulm, and cover with litter, as before, and this spring of the third year, put on ashes again, or fine manure, and throw over the beds the earth that will come out of the paths dug six inches deep. I suppose your beds four feet wide, and your paths two feet. After this, you are to cut down the haulm in the fall, cover with litter in the winter, fork up, and occasionally manure in the spring.

Another method to make the beds, is to begin with *plants*, instead of seed. The plants (raised as above stated,) may be planted in the beds at one year old, or older. Plant them at the same depth pointed out for depositing the seed. And, in all other respects, proceed as in the case of a bed begun with seed.

Balm is an herb purely medicinal. A very little of it is sufficient in a garden, and it is propagated from seeds or from offsetts. When once planted, the only care is to see that it does not extend itself too far.

Bean (Kidney.) Endless is the variety of sorts. Some are *dwarfs*, some *climbers;* but the mode of propagating and cultivating, is nearly the same in all, except that the dwarfs require smaller distances than the climbers, and that the latter are grown with poles, which the former are not. In this fine country, the seed is so good, the soil and climate so favorable to the plant, the use of the vegetable so general and the propagation and cultivation so easy, and so well understood, that little in detail need be said about them. I prefer sowing the dwarfs in *rows* rather than *bunches*. It is useless to sow them while the ground is cold, for they will not grow till it be warm.

Beet. This vegetable, which is little used in England, is here in as common use as the carrots are there. It should be sown in the fall, but if not, as soon as the frost is out of the ground in the spring, and is dry. The rows a foot apart, and the plants eight inches apart in the rows. In order to hasten the seed up in the spring, if sown then, soak it four days and nights in rain water, before you sow it. Put it two inches deep, cover it well and press the earth down hard upon it. Sow the seed pretty thick all along in the drill, and when the plants come up, thin them to eight inches apart. Hoe between the plants frequently, but not very deep, because these tap rooted things are apt to fork if the ground is made loose very low down while they are growing. There are yellow and white beets, as well as red. But the red are the true kind; the others are degenerate. There is, however, the *round or turnip-rooted* red beet, which is equally good with the tap-rooted beet. The ground should be rich, but not fresh dunged. Ashes of wood

or compost mould, is best; and the digging ought to be very deep, and all the clods ought to be broken into fine earth, because the clod turns the point of the root aside, and makes the top short or forked. Beets may be transplanted and will in that way get to a good size.

Brocoli. This plant is not much cultivated in America. In England it is grown in great quantities, especially near London. It is there sown in the spring. It is of the nature of the cauliflower, which see. One sort has a whitish head, and is like a cauliflower, except that the white is a yellow white. It is cultivated, in all respects, like the cabbage, (which see;) but as it is large, it must be placed at wider distances, not less than two feet and a half each way. If raised very early in the spring, and planted out in June, and in good ground, as *cool* as can be got, it will have heads in October, and if any of the plants have not then perfected their heads, they may be treated like those of the cauliflowers which have not perfected theirs, (which see.) Fifty of this plant for the fall may be enough; and they ought to be planted out in the *south* border, in order to be as cool as possible. The white sort is deemed the handsomest, but the others are more hardy.

Cabbage. To raise cabbage plants in the open ground, put your seed rows at six inches distance, and put the seeds *thin* in the row. As soon as up, thin the plants to three inches in the row. But to have fine cabbages of any sort, the plants must be *twice* transplanted. *First*, they should be taken from the seed bed, (when they have been sown in drills near to each other,) and put out into fresh dug, well broken ground, at six inches apart every way. This is called pricking out.—By standing here about fifteen or twenty days, they get straight and strong, stand erect, and have a stout stem. If you do not intend to prick out, leave the plants thinner in the seed bed, and hoe deep between them while they stand there. Besides this you may pass a sharp spade along under the rows, and cut off the tap-roots; for they must be shortened when transplanted. This, if done a week or ten days before transplanting, will give the plants a more bushy root; and will, in some measure, supply the place of pricking out. Having the plants ready, you proceed to the work of transplanting, observing the directions given under the head *Transplanting*. Put them in rows, of course. As to distances, they must be proportioned to the size which the cabbages usually come to. For the very small sorts, the Early Dwarf and Early Sea Green, a foot apart in all directions is enough. The next size is the Early York, which must have sixteen inches every way. The Sugar Loaf may have twenty inches. The Battersea and Savoy, two feet and a half. The large sorts, as the Drum-head and others, three feet at least.

Now with regard to the tillage, keep the ground clear of weeds.—But, whether there be weeds or not, hoe between the plants in ten days after they are planted. You cannot dig between the plants which stand at the smallest distances, but you may, and ought, to dig once, if not twice, during their growth, between all the rest. To prevent a sudden check, by breaking all the roots at once in hot weather, dig every other interval, and dig the rest a week later. All the larger sorts of cabbages should, about the time their heads begin to form, be earthed up; that is, have the earth from the surface drawn up against the stem; and the later the plants are, the higher should the earth be drawn.—After this, dig, or hoe deep, the rest of the ground. As to sorts, the

earliest is the Early Dwarf; the next is the Early Sea Green; then comes the Early York. The Sugar Loaf, sweetest and richest of all cabbages, if sown and transplanted when Early Yorks are, will head nearly a month later. For winter use, then, there really needs nothing but the Dwarf Green Savoy. When good and true to kind it is very much curled, and of a very drep green. It should be sown as soon as the ground is at all warm, and planted out as soon as stout enough. By November, it will have large and close heads, weighing from five to eight pounds. This is the best of all winter cabbages. If you have Drum heads, or other large cabbages, the time of sowing, and that of transplanting, are the same as those for the Savoy. The Red Cabbage is raised and cultivated in the same season and same manner as the Green Savoy. There are many other sorts of cabbages, early and late, and they may be tried; but those above mentioned are certainly sorts enough for any family.

As to *saving the Cabbage Seed.* The cabbage is a biennial. It brings its flower and its seed the second year. To have seed, therefore, you must preserve the cabbage, head, root, and all, throughout the winter; and this must be done in the cellar, or under cover out of doors; for the root must be kept in the ground all winter.

CAMOMILE is a medicinal plant of great use. It is perennial, and though it may be propagated from the seed, it is easiest propagated by parting the roots. One little bit of a root will soon make a bed large enough for a garden. The *flowers* are used in medicine. They should be gathered before they begin to fade, and be dried in a gentle sun or in the shade; and then put by in paper bags, in a dry place.

CARAWAY. The seeds are used in cakes. The plant is an annual. Sow in the spring, in a fine rich ground, and leave the plants eight inches apart, each way.

CARROT. Read the article Beet; for the same season, same soil, same manure, same preparation for sowing, same distances, same interculti-vation, same time of taking up, &c., all belong to the carrot. Some fine roots may be carefully preserved to plant out for seed in the spring; and the seed should be taken only from the *centre* seed stock of the carrot, for that is the finest. The mark of a good kind of seed is, *deep* red color of the tap. The pale ones are degenerate; and the yellow ones are fast going back to the wild carrot. A cow will nearly double her milk, if taken from common pasture in October, and fed on carrot greens, or tops; and they may, at this season, be cut off for that purpose.

CAULIFLOWER. It is not without some difficulty that this plant is brought to perfection in any country where the frost is severe in winter, and especially where the summers are as hot as they are in every part of the United States, still it may be brought to perfection. It is a *cabbage*, and the French call it *flower cabbage*. Its head is a lump of rich pulp, instead of being, as a cabbage head is, a parcel of leaves folding in towards a centre, and lapping over each other. The cauliflower is an annual plant, and ripens its seed, during the season it is sown; and, in fact, the part which is eaten is not, as in the cabbage, a lump of leaves, but the seed stalks, pods, and blossoms, in their embryo and compact state, before they expand. It is the same in brocoli.

Cauliflowers may be had to eat in the fall or spring. To have cauliflowers to eat in the fall is much the easiest matter, and then they are more valuable than in the spring. Sow at the same time and in the same manner, as you do early cabbages. Treat the plants in the same way; put them at two feet and a half distance; they will begin to come early in October; and if any of them have not perfected their heads when the sharp frosts come, take them up by the roots, hang them up by the heels in a warm part of the barn; they will get tolerably good heads. The quantity of this plant must depend on the taste for it; but, it is so much better than the very best of cabbages, than it is worth some trouble to get.

*Celery*. There are three or four sorts. The *white*, the *red*, the *hollow* and the *solid*. The *hollow white* is the best; but the propagation and cultivation of all are the same. The whole of that part of the year, during which the frost is out of the ground, is not a bit too long for the getting of *fine celery*. The seed sown in the cold ground in April, will lie *six weeks before it comes up*. But a hot bed will bring the seeds up in *two weeks*. As soon as the plants are *three inches high*, and it scarcely matters how thick they stand, make a nice little bed in open air, make the ground rich and very *fine*. Then prick out the plants at four inches apart. They are so very small, that this must be gently done; and they should be gently watered once, and shaded two days. In this bed the plants stand till the middle of July, or thereabouts, when they are to go out into trenches. Make the trenches a foot deep and a foot wide, and put them not less than *five feet asunder*. The ground that you make the trenches in should not be fresh dug, but be in a *solid state*, which may conveniently be, for celery comes on just as peas and early cabbages have gone off. When you have made your trench, put along it some good rich compost manure consisting partly of wood ashes. Not *dung;* or at least, not dung fresh from the yard, for the celery will be *rank and pipy*. Dig this manure in, and break all the earth very fine as you go. Then take up your plants, and trim off the long roots. You will find that every plant has offsets to it coming up by the side of the main stem. Pull all these off, and have only the single stem. Cut the leaves off, so as to leave the whole plant about six inches long. Plant them six inches apart, and fix them well. Do not water the plants; and if you plant in fresh dug ground and fix your plants well, none of the troublesome and cumbrous business of *shading* is at all necessary; for the plant is naturally hardy, and, if it has heat to wither it above, it has also that heat below to cause its roots to strike out almost instantly. When the plants begin to grow, which they will quickly do, *hoe* on each side and between them with a small hoe. As they grow up, earth their stems, that is, put the earth up to them, but not too *much at a time*, and let that be finely broken, and not at all cloddy. While you do this, keep the stalks of the outside leaves close up to prevent the earth from getting between the stems of the outside leaves and the inner ones; for, if it gets there, it checks the plant and makes the celery bad. Earth up *very often*, and not put much at a time. Every week a little earth to be put up. Thus in October you will have celery fit for use.

Cucumber. To give minute rules for the propagation and cultivation of this plant, in a country like this, would be waste of time. How-

ever, if you wish to have them a *month earlier* than the natural ground will bring them, do this. Make a hole, and put into it a little hot dung, let the hole be under a warm fence. Put six inches deep of fine earth, and rich, on the dung. Sow a parcel of seeds in the earth, and cover at night with a bit of carpet, having first fixed some hoops over this little bed. Before the plants show the *rough* leaf, plant two into a little flower pot, and fill as many pots in this way as you please. Have a large bed ready to put the pots into, and covered with earth, so that the pots may be plunged in the earth up to their tops. Cover this bed like the last. When the plants have got *two* rough leaves out, they will begin to make a *shoot* in the middle. Pinch the shoot off. Let them stand in this bed, till your cucumbers *sown in the natural ground, come up:* then make some holes in good rich land, and taking a pot at a time, turn out a ball and fix it in the holes. These plants will bear a *month sooner* then those sown in the natural ground; and if well managed, will continue bearing till September. Those who have *hot-bed frames*, will do this matter very easily. The cucumber plant is very tender and juicy; and, therefore, when the seedlings are put into the pots, they should be *watered* and *shaded* for a day or two, so also when the balls are turned out. I have one observation to make on the cultivation of cucumbers, melons of all sorts, and of all the pumpkin and squash tribe; and that is, that it is a great error, to sow them *too thick*. One plant in a hill is enough. One will bring more weight of fruit than two, (if standing near each other,) two, more than three, and so on till you come to fifty in a square foot. Let any one make the experiment, and he will find it mathematically true. The roots of cucumbers will go ten feet, in fine earth, in every direction. Judge then, how ten plants, standing close together, will produce mutual starvation. If you save a cucumber for seed, let it be the *first* fine fruit that appears on the plant.

Coriander is an annual plant that some persons use in soups and salads. It is sown in the spring. The seed is also used as a medicine. A small patch, probably two square yards, will be enough.

Cress, (or Pepper Grass,) is very good in salads, along with lettuces, &c. It should be sown in little drills, very thick, and cut before it comes into rough leaf. A small quantity in the salad season should be sown every six days.

Fennel. This is a *perennial plant*, propagated from seeds or from offsets; and sown, or planted, early in the spring or fall. The plants should stand about a foot asunder. It is a tall plant, with *hairy* leaves. Its leaves are used in salads, are chopped up fine to put in melted butter, to eat with fish, they are boiled with fish to give them a flavor, and they are tied around *mackerel*, particularly when they are boiled. The French who excel in cooking fish, always do this. In winter, the seeds bruised, give fish the same flavor as the leaves do in summer. It is a very hardy plant. Two yards square will contain enough for any family; and, once in the ground, will stand for an age.

Garlick. Almost all nations, except the English, the Americans, and the French, make great and constant use of garlick; and even the French use it frequently to an extent that would drive us from the table. It is propagated from seed, or from offsetts, and is sown, or planted, either in the spring or fall. For winter use, the roots are taken up, and kept dry, as onions are.

HOP. Any bit of a root will grow and become a plant. The young plants should be planted in the fall, three or four together, in a clump, or hill, and the hills should be seven to ten feet apart. The first year of planting, put four rods, or little poles to each hill, and let two vines go up each pole, treading the rest of the vines down to creep about the ground. In a month after the vines begin to mount the poles, cut off all the creeping vines, and draw up a hill of earth around the poles, a foot high, covering all the crowns of the plant. At the end of another month, draw some more earth up, making the hill higher and higher. When the fall comes, cut off all the vines, that have gone up the poles, a foot from the ground; take down the poles, dig down the hills, and open the ground, all round the crowns of the plants; and before winter sets in, cut all down to the very crowns, and then cover over the crowns with earth three or four inches thick. Through this earth, the hop-shoots will start in the spring. You will want but eight of them to go up your four poles; and the rest, when three inches long, you may cut, and eat as *asparagus*. This year, you put poles 20 feet long to your hops. Proceed the same as before, only make your *hills larger;* and this year you will have plenty of hops to gather for use. Be sure to open the ground every fall, and cut all off close down to the *crown of the plants*. They are fit to gather, when you see, upon opening the leaves of the hop, a good deal of *yellow dust*, and when the seeds which you will find at the socket of the leaves of the hop, begin to be plump. Gather them nicely, and let no leaves or stocks be among them, and lay them out on a cloth to dry in the sun, taking care that no rain or dew fall on them. When *perfectly dry*, put them, very hardly and closely pressed, into a new bag, made of thick Russia linen; and in this state they will keep good, and fit for use, for twenty, or perhaps, three times twenty years.

HORSE-RADISH. Like every other plant, this bears *seed;* but it is best propagated by cutting bits of the root into lengths of two inches, and putting them, spring or fall into ground about a foot deep, with a setting stick. They will find their way up the first year, and the second they will be fine large roots, if the ground be trenched deeply, and made pretty good. Though a very valuable and wholesome article of diet, it is a most *pernicious weed*.

LAVENDER. A beautiful little well-known shrub, of uses equally well known. Hundreds of acres are cultivated in England, for the flowers to be used in distillation. It may be propagated from seed, but is easiest propagated from slips, taken off in the spring, and planted in good moist ground in the shade. When planted out, it should be in rows, three feet apart, and two feet apart in the rows. If the flowers are to be preserved, the flower stalks should be cut off before the blossoms begin to fade at all.

LEEK. There are two sorts; the *narrow leaved*, and the *flag-leek*, the latter of which is much the best. Some people like leeks better than onions; and they are better in soup. Sow in the fall, or as early in the spring as you can. About four yards square is enough. Put the rows eight inches asunder, and thin the plants to three inches apart in the row. Hoe deeply and frequently between the plants till the middle of July, and then take the plants up, cut their roots off to an inch long, and cut off the leaves a good way down. Make trenches

like those for celery, only not more than half as deep and half as wide, and proceed in the same manner as in the case of celery.

LETTUCE. There are, I believe, twenty sorts, two of which only it will be enough to mention, *green coss*, *white coss*, the former of which is a darker green than the latter, is rather hardier, and *not quite so good*. These when true to their kind, and in a proper situation, rise up and fold in their leaves to a solid loaf, like the sugar loaf cabbage; and, in rich ground, with good management, will become nearly as large. When you cut one of these from the stem, and pull off its outside leaves, you have a large lump, enough for a salad for ten people. You must raise them in the spring, in precisely the same manner as the very earliest cabbage plants, (which see.) Put the plants out into the natural ground, about a fortnight before the general corn planting time. Do not put them in a place full to the sun. Make the ground quite *rich*, break it well, and, in transplanting, keep as much earth about the roots as you can, and give as little water; and transplant *in the evening*. Let one plant, (a very fine one,) stand for seed, and it will give you plenty of seed for a year or two.

MELONS. There are, all the world knows, two distinct tribes; the *Musk* and the *Water*. Of the former, the sorts are endless, and indeed, of the latter also. In this fine country, where they all come to perfection in the natural ground, no distinction is made as to *earliness*, or lateness in sorts. Amongst the Musk, the Citron is, according to my taste, the finest by far; and the finest Water melons that I have ever tasted, were raised from the seed that came from a melon raised in Georgia. As to the manner of propagating, cultivating, and sowing the seed of melons, see cucumber; and only observe that all that is there said, applies to melons as well as to cucumbers. The soil should be *rich* for melons, but it ought not to be *freshly* dunged. They like a light and rather sandy soil. Melons should be cultivated well.

MINT. There are two sorts; one is of a darker green than the other; the former is called *peppermint*, and is generally used for *distilling* to make mint water: the latter, which is called *spearmint*, is used for the table in many ways. The French snip a little into their *salads*: we boil a bunch amongst green peas, to which it gives a pleasant flavor; chopped up small, and put, along with sugar, into vinegar, we use it as sauce for *roasted lamb*; and a very pleasant sauce it is. Mint *may* be propagated from seed; but a few bits of its root will spread into a bed in a year.

MUSTARD. There is a *white seeded* sort, and a *brown seeded*. The white mustard is used in salads along with cress, and is sown and cultivated in the same way. The *black* is that which table mustard is made of. It is sown in rows, two feet apart, early in the spring. The plants ought to be thinned to four or five inches apart. Good tillage between the rows. The seed will be ripe in July, and then the stalks should be cut off, and when quite dry, the seed should be threshed out, and put by for use. Why should any man who has a garden, want to *buy* mustard? Why should he want the English to send him out, in a bottle, and sell him for a quarter of a dollar, less and worse mustard, than he can raise in his garden for a penny? The plants do not occupy the ground more than fourteen weeks, and may be followed by another crop

of any plant, and even of mustard, if you like. This, therefore, is a very useful plant, and ought to be cultivated by every farmer, and every man who has a garden.

Onion. This is one of the main vegetables. Its uses are many, and they are all well known. The modes of cultivation for a crop are various. *Three* I shall mention, and by either, a good crop may be raised. Sow in the fall or spring; let the ground be rich, but not from *fresh dung*. Make the ground very fine; mark the rows a foot apart and scatter the seed *thinly* along a drill two inches deep. Then fill the drills; and press the earth down upon the seed by *treading the ground all over*. Then give it a *very slight* smoothing with the rake. When the plants get to be three inches high, then thin them to four inches. Keep the ground clear of weeds by hoeing, but do not *hoe deep*, nor raise earth about the plants; for these make them run to *neck* and not to *bulk*. When the tip of the leaves begin to be brown, bend down the necks, so that the leaves lie flat with the ground. When the leaves are nearly dead, pull up the onions, and lay them to dry, in order to put away for winter use. Some persons, instead of sowing the onions all *along the drill*, drop four or five seeds at every six or seven inches distance, and leave the onions to grow in *clumps;* and this is not a bad way; for they will *squeeze each other out*. They will not be large; but they will ripen *earlier*, and will not run to *neck*. The third mode of cultivation is as follows:—Sow the onions any time between April and the middle of June, in drills *six inches apart*, and put the *seed very thick* along the drills. Let all the plants stand, and they will get to be about as big round as the top of your little finger. Then the leaves will get yellow; and when that is the case, pull up the onions, and lay them on a board till the sun has withered up the leaves. Then put them in a bag, and lay them up in a dry place till spring. As soon as the frost is out, and the ground dry, plant out these onions in good, fine ground, in rows a foot apart. Do not cover them with earth; but just press them down with your thumb and fore finger. Proceed after this as with sown onions; only observe, should any be running up to seed, *twist down the neck* at once. Preserving onions is an easy matter. Any dry, airy place, will do, for frosts never hurt them, if not moved while frozen.

Parsley. This, it is well known, bears its seed the second year, and then dies away. It may be sown at any season, when the frost is out of the ground. The best way is to sow it in the spring, and in very clean ground; because the seed lies long in the ground, and, if the ground be foul, the weeds choak the plants at their coming up. A bed six feet long, and four feet wide, the seed sown in drills at eight inches apart, is enough for any family.

Parsnip. As to the season for sowing, sort of land, preparation of ground, distance, cultivation and tillage, precisely the same as the *Carrot*, which see. But as to preservation during winter, and for *spring use*, the *Parsnip* stands all frost without injury, and even with benefit.

Pea. This is one of those vegetables which all men most like. Its culture is universal where people have the means of growing it. The soil should be good, and *fresh dung* is good manure for them. Ashes, and compost, very good; but peas, like corn, will bear to be actually sown upon dung. The sorts are numerous, one class is of a *small* size,

and the other *large*. The latter grow taller, and are longer in coming to perfection, than the former. The earliest of all is the little white pea, called, on Long Island, the *May pea*, in England, the *early frame pea*. Then come the *early Charlton*, the *Hotspur*, the *Blue pea*, the *Dwarf* and *Tall Marrowfat:* and several others. All the sorts may be grown in America, *without sticks*, and even better than with. I have this year the finest peas I ever saw, and the crop the most abundant. And this is the manner in which I have sown and cultivated them. I plough the ground into ridges, the tops of which (for the dwarf) were four feet apart. I then put a good parcel of yard manure into the furrows, and ploughed the earth back upon the dung; I then levelled the top of the ridge a little, and drew two drills upon it, at six inches distance from each other. In these I sowed the peas. When the peas were about three inches high, I hoed the ground deep and well between the rows, and on each outside of them. I then ploughed the ground from them, and to them again, in the same way, as in the case of the Swedish Turnip. In a week or two afterwards, they had another ploughing, and soon after this they fell, *and lay down the side of the ridges*. This was the way in which I managed all the sorts. This was of every sort the finest crop I ever saw in my life. The culture in the garden may be the same, except that the work which was done with the *plough*, must be done with the *spade*.

*As to seasons*, the early peas may be sown in the *fall*, but care must be taken to guard against the *mice*. Sow about four inches deep, and tread the ground well down. When the frost sets in, all is safe till winter breaks up. These peas will be earlier by ten or fifteen days, than any you can sow in the spring. If you sow in the spring do it as soon as the ground is dry enough to go upon. Sow the May pea, some Charltons, some Hotspurs, some Blue peas, and some Marrowfats, they will come one after another, till nearly August. In June (about the middle) sow some early peas again, and also some marrowfats; these will give you peas until September. Sow some of each sort middle of August, and they will give you green peas till the *hardish* frosts come. But these two last sowings ought to be under the south fence, so as to get as much *coolness* as possible.

Pennyroyal. A medicinal herb. It is perennial. A little patch a foot square, is enough.

Peppers, (or Capsicum.) An annual plant, sown early in fine earth, in drills a foot apart, and at six inches apart in the drills. It is handsome as a flower, and its pods are used as a pickle.

Pumpkins. *See Cucumber*. The cultivation is the same, and every body knows the different qualities and the different sorts, and how to preserve and use them.

Radish. A great variety of sorts. Sown *thin*, in little drills six inches asunder. Sown as early as possible in the spring, and a little bed every three weeks all summer long. The early scarlet is the best. Radishes may be raised early in a hot bed precisely as cabbage plants are.

Rhubarb. This is one of the capital articles of the garden. The dock is the wild Rhubarb. Rhubarb plant comes forth, like the dock, very early in the spring. When its leaves are pretty large, you cut

them off close to the stem, and if the plant be fine, the *stalk of the leaf* will be from eight inches to a foot long. You peel the outside skin from the *stalk*, and then cut the stalks up into bits about as large as the first joint of a lady's third finger. You put these into puddings, pies, and tarts, just as you would green currants. This plant is very hardy, and is raised from *seed*, from *roots*, and will grow in any ground, and the same plants will last for an age. It is a very valuable plant, and no garden ought to be without it.

ROSEMARY, is a beautiful little shrub. One of them may be enough in a garden. It is propagated from slips taken off in the spring, and planted in a cool place.

SAGE is raised from seed, or from slips. To have it on hand for winter, it is necessary to dry it; and it ought to be cut for this purpose, *before it comes into bloom*, as indeed is the case with all other herbs.

SPINACH. To have spinach very early in the spring, sow on or about the first week in September, in drills a foot apart, and when the plants are well up, thin them to six inches. They will be fine and strong by the time the winter sets in; and, as soon as that comes, cover them over well with straw, and keep it on till the breaking up of frost. Sow more as soon as the frost is out of the ground; and this will be in perfection in June. If you save seed, save it from plants that have stood the winter.

SQUASH is, in all its varieties, cultivated like the cucumber, which see.

TANSY, a perennial, culinary, and medicinal herb, propagated from seeds or offsets. One root in a garden is enough.

THYME. There are two distinct kinds; both are perennial, and both may be propagated either from seeds, or by offsets.

TURNIP. The sorts of turnip are numerous, but, for a garden, it is quite sufficient to notice three; the *early white*, the *flat yellow*, and the *Swedish* or *Ruta baga*, which is a very different plant from the two. The two former sorts should be sown about the end of July, in rows (in a garden) two feet apart, and thinned out to a foot distance in the rows. Good and deep hoeing, and one digging, should take place while they are growing; for a large turnip is better, of the same age, weight for weight, than a small one. The Swedish turnip, so generally preferred for table use, ought to be sown early in June, in rows at a foot apart and thinned to three inches in the rows. About the middle of July, they ought to be transplanted (in a garden) upon ridges three feet apart, and during their growth, kept clean, and be dug between, twice at least, as deep as a good spade can be made to go.

## PROPAGATION, PLANTING, AND CULTIVATION OF FRUITS.

PROPAGATION. All the fruits to be treated of here, except the strawberry, are the produce of *trees* or of *woody plants*. All these may be propagated from seed, and some are so propagated. But others are usually propagated by cuttings, slips, layers, or suckers; or by budding or grafting upon stocks. When the propagation is from seed, the sowing should be in good ground, finely broken, and the seed should by no means be sown too thick.

## PROPAGATION &C. OF FRUIT TREES.

CUTTINGS are short pieces, cut in the spring, from shoots of the *last year*; and it is, in most cases, best, if they have a joint or two of the former year's wood at the bottom of them. The cuttings should have, altogether about six joints or buds; and three of these should be under ground when planted. The cuts should he performed with a sharp knife so that there be nothing ragged or bruised about the wood or bark. The time of taking off cuttings, is that of the breaking up of the frost. They should be planted in a *shady* place, and watered with rain water in dry weather, until they have got shoots several inches long. When they have such shoots, they have roots, and no more watering is necessary. Besides these occasional waterings, the ground should, especially in hot countries, be covered with leaves of trees, or muck, or something that will keep the ground cool during the hot and dry weather.

SLIPS differ from cuttings in this, that the former are not *cut*, but *pulled* from the tree. You take a shoot of the last year, and pull it downwards, and thus slip it off. You trim the ragged bark off, then shorten the shoot, so that it have six joints left, and then plant it, and manage it in the same manner directed for cuttings. The season for doing this is also the same.

LAYERS. You take a limb, or branch of a tree, in the fall, or early in the spring, and pull it down in such a way as to cause its top, or small twigs and shoots to lie on the ground. Then fasten the limb down by a peg or two, so that its own force will not raise it up. Then prune off all its small branches and shoots that stick upright; and having a parcel of shoots laying horizontally, *lay* earth upon the whole, all along upon the limb, from the point where it begins to touch the ground, and also upon all the bottoms of all the shoots. Then cut the shoots off at the points, leaving only two or three joints or buds beyond the earth. The earth laid on should be good, and the ground freshly dug, and made very fine and smooth, before the branches are laid upon it. The earth laid on should be from six inches to a foot thick. If the limb, or mother branch be very stubborn, a little cut on the lower side of it will make it the more easy to be held down. The ground should be kept clear from weeds, and as cool as possible in hot weather. These layers will be ready to take up and plant as trees, after they have been laid a *year*.

SUCKERS, are, in general, but poor things, whether in the forest, or in the fruit garden. They are shoots that come up from the roots, at a distance from the stem of the tree, or, at least, they do not come out of that stem. They run to wood and suckers more than trees do that are raised in any other way. Fruit trees raised from suckers do not bear so abundantly, or as good fruit, as trees raised from cuttings, slips, or layers. A sucker is in fact a little tree, with less of root to it, and is, of course, to be treated as a tree.

BUDDING. To have fruit trees by this method, or by that of *grafting*, you must first have stocks, that is to say, a young tree to graft or bud upon. What are the sorts of stocks proper for the sorts of fruit trees respectively, will be mentioned under the names of the latter. The stock is a young tree of some sort or other, and the bud is put into the bark on the side of this young tree during the summer, and not before

the bud be full and plump. The work may generally be done all through the months of July and August, and perhaps later.

Grafting is the joining of a cutting of one to another tree, in such a way, as that the tree on which the cutting is placed, sends up its sap into the cutting, and makes it grow and become a tree. Now as to the way in which this and budding is done, they cannot become matter of written description. To read a full and minute account of the act of budding and grafting, would require ten times the space of time to go to a neighbor's, and learn the operation from sight. The season for taking off the cuttings for grafts, is any time between Christmas and March.

Stocks must be of different ages and sizes in different cases; and even the propagation of the stocks themselves is not to be overlooked. Stocks are formed out of suckers, or raised from the seed; and the latter is by far the best. If the stocks are to be of crabs or apples, the seeds of these should be collected in the fall, when the fruit is ripe. They are generally got out by mashing the crabs or apples. When the seeds are collected, put them immediately into fine earth; or sow them at once. If the stocks are to be of stone fruit, the stones as of cherries, plums, peaches and others, must be got when the fruit is ripe. The best way is to put them into fine earth, and keep there till spring. The earth may be placed in the cellar. When the winter breaks up, dig a piece of ground deep and make it rich; make it very fine; form it into beds three feet wide; draw drills across it at eight inches distance; make them from two to three inches deep; put in the seeds pretty thick; cover them completely; tread the earth down upon them, and then smooth the surface. When the plants come up, thin them to about three inches apart, and keep the ground between them perfectly clean during the summer. These seedlings, if well managed, will be eight inches high the first summer, and some higher. The next spring they should be taken up; or this may be done in the fall. They should be planted in rows four feet apart, and at two feet apart in the rows. They should be kept clean by hoeing, and the ground between them should be dug in the fall, but at no other season. The plants will grow fast or slowly according to the soil and management; and he who knows how to bud or graft, will know when the stock is arrived at the proper size for each purpose.

Planting. The tree to be planted, should be as young as circumstances will allow. The season is just when the leaves become yellow, or as early as possible in the spring. The ground being prepared, and the tree taken up, prune the roots with a sharp knife, so as to leave none more than a foot long, and leave no bruises or ragged parts. Cut off all the fibres close to the roots, for they never live, but mould, and do injury. Dig the hole to plant in three times as wide, and six inches deeper than the roots actually need as mere room. And now, besides the fine earth, have some good mould sifted. Lay some of this six inches deep at the bottom of the hole. Place the roots upon this in their natural order, and holding the tree perfectly upright, put more sifted earth upon the roots. Every root should be closely touched by the earth in every part. When you have covered all the roots with the sifted earth, fill up the rest of the hole with common earth, and when you have filled it, tread the earth that you have put in, but not very hard. Put on the rest of the earth, and leave the surface per-

fectly smooth. Do not water by any means. Water poured on, sinks rapidly down, and makes cavities among the roots—lets in air—mould and canker follow; and great injury is done.

## CULTIVATION.

The cultivation of fruit trees divides itself into two distinct parts; the management of the tree itself, which consists of pruning and tying; and the management of the ground where the trees grow, which consists of digging, hoeing and manuring. The management of the tree differs with the sort of tree, and will therefore be treated of under its own particular name. But the management of the ground is the same in the case of all the larger trees.

In the first place the ground is always to be kept clear of weeds; for what they take is just so much taken from the fruit, either in quantity or quality, or in both. From the spring to the fall frequent hoeing all the ground over, not only to keep away weeds, but to keep the ground moist in hot and dry weather, taking care never to hoe but when the ground is dry at top. This hoeing should not go deeper than four or five inches; for there is a great difference between trees and herbaceous plants, as to the renewal of the roots. The roots of the latter, when cut off, will come out in 12 hours, and the operation, by multiplying the mouths of the feeders of the plants, gives it additional force. But roots of trees consist of wood more or less hard; they do not quickly renew themselves; and they must not be much mutilated during the time that the sap is in flow. Therefore the ploughing and digging between trees ought to take place only in the fall, which gives time for a renewal, or new supply of roots, before the sap be again in motion.

## LIST OF FRUITS.

APPLE. Apples are usually grafted on *crab stocks;* but when you do not want the trees to grow tall and large, it is better to raise stocks from the seed of some apple not much given to produce large wood. Perhaps the Fall Pippin seed may be as good as any. When you have planted the tree, and when the time comes for shortening the head, cut it off so as to leave only five or six joints or buds. These will send out shoots, which will become limbs. The tree will be what they call in England, a *dwarf-standard*, and of this description should be all trees in gardens. As to *pruning*, see Peach.

APRICOT. This is a very delightful fruit. It comes earlier than the peach, and some like it better. It is a harder tree, and bears as well as the peach; and the tree when well raised, planted, and cultivated, will last a *century*. Apricots are budded or grafted upon *plum stock*, or upon stocks raised from apricot stones. They do not bear as soon as the peach by one year. For the pruning of them, see Peach.

CHERRY. Cherries are budded or grafted upon stocks raised from cherry stones of any sort. If you want the tree tall and large, the stock should come from the small black cherry tree that grows wild in the woods. If you want it dwarf, sow the stones of a *Morello* or a *May*

*duke*. To *preserve* cherries, gather them *without bruising;* take off the tails; lay them in the sun, or on dry, deal boards; when quite dry, put them by in bags in a dry place. They form a variety in the tart-making way.

CURRANT. These are *red*, *white*, and *black*, all well known. The propagation and cultivation of all sorts are the same. The currant tree is propagated from cuttings, and the cuttings are treated as has been seen in the paragraph headed cuttings. When the tree has stood two years in the nursery, plant it where it is to stand, and take care that it has only *one stem*. Let no limbs come out to grow nearer than six inches of the ground. Prune the tree every year. Keep it *thin of wood*. Keep the middle open and the limbs extended, and when these get to about three feet in length, cut off, every winter, *all the last year's shoots*. Cultivate and manure the ground as for other fruit trees. In this country, the currant requires *shade* in the summer. If exposed to the full sun, the fruit is apt to become too sour.

FILBERD. This is a sort of nut, oblong in shape, very thin shell, and superior in flavor. The filberd is a tall tree, and will, under favorable circumstances, reach the height of thirty feet. It is propagated from *layers*, or from suckers. The layers are treated like other layers, and soon become trees, for which reason they are preferable to suckers. Every farmer should provide himself with some of this sort of tree.

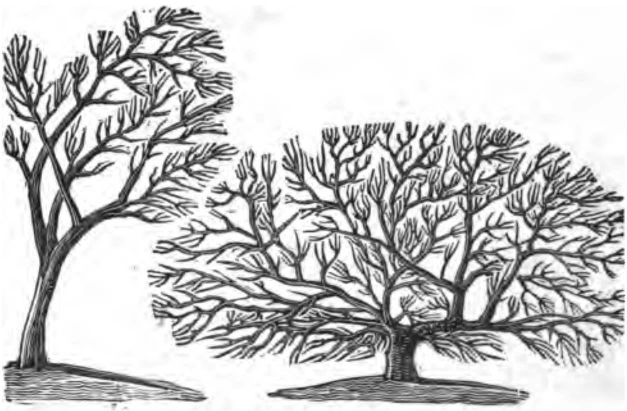
GOOSEBERRY. Various are the sorts, and no one that is not good. The shrub is propagated precisely like that of the currant. By cultivation, they may be raised as large as pigeon's eggs, and the crops the trees will bear is prodigious.

NECTARINE. As to propagation, planting and cultivation, the Nectarine is, in all respects, the same as the peach, which see. It is certainly a finer fruit, and there is no insurmountable obstacle in the way of its growth in this country. It is grown in England very well, but it is not grown, or but very little, here. It is the most beautiful of fruit, and a great bearer.

PEACHES. Peaches are propagated by *budding*. The stock should be of *plum*, and the tree is to be planted agreeable to the directions given under the head PLANTING. And now for the pruning and forming the tree. Look at the figures 1, and 2. The first is a peach tree such as it should be at four or five years old; the last is a peach tree such as we generally see at that age. The practice is to plant the tree, and let it grow in its own way. The consequence is, that it runs up to a long naked stem, with two or three long naked limbs, having some weak little boughs at the top; this is Fig. 2. Now to have Fig. 1, this is the way. The tree should, in the first place, be budded very near to the ground. After it be planted, cut it down to within a foot and a half of the ground, and always cut sloping close to a bud. In this foot and a half there will be many buds, and they will the first summer send out many shoots. Now, when shoots begin to appear, rub them all off but *three*. Leave the top one, and one *on each side*, at a suitable distance lower down. These will in time become limbs. The next year top the *upright* shoot (that came out of the top bud,) again so as to bring out other *horizontal limbs*, pointing in a different direction from those that came out last year. Thus the tree will get a *spread*.

LIST OF FRUITS.

Fig. 2. Fig. 1.



PEACH TREES.

After this you must keep down the aspiring shoots, and every winter cut out some of the weak wood, that the tree may not be overburdened with wood. If in time the tree be getting thin of bearing wood towards the trunk, cut some of the limbs back, and then they will send out many shoots, and fill up the naked places. The lowest limb of the tree should come out of the trunk at not more than *nine* or *ten inches* from the ground. By this management, the tree is always in a state of full bearing; *always young*.

Pears. Pears are grafted on *pear stocks*, on *quince stocks*, or on those of the *white thorn*. The last is best, because most durable; and for dwarf trees, much the best, because they do not throw up wood so big or so lofty. For orchards, *pear stocks* are the best; but not from *suckers* on any account.

Plums. This tree is grafted upon plum stocks, raised from stones by all means; for suckers send out a forest of suckers.

Quince, should grow in a moist place and in very rich ground. It is raised from cuttings, or layers, and these are treated like other cuttings and layers.

Raspberry. A sort of *woody herb*, but produces fruit that vies, in point of crop, as well as flavor, with that of the proudest tree. They are raised from *suckers*, though they may be raised from cuttings.—The suckers of this year, are planted out in rows, six feet apart, and the plants two feet apart in the rows. This is done in the fall or early in the spring. At the time of planting they should be cut down, to within *a foot* of the ground. They will bear a little, and they will send out several suckers which will bear next year. About four is enough to leave, and those of the strongest. These should be cut off in the fall or early in the spring, to within four feet of the ground, and should

be tied to a small stake. To have fine, you must dig in the same manner in the autumn.

STRAWBERRY. This plant is a native of the woods and fields. There are many sorts, and all are improved by cultivation. They are propagated from young plants that grow out of the old ones. In the summer, the plant sends forth *runners*. When these touch the ground at a certain distance from the plant, come roots, and from these roots, a plant springs up. This plant is put out early in the fall.

To make a strawberry bed, plant three rows, a foot apart, and at eight inches apart in the rows. Keep the ground clean, and the new plants coming from runners will fill up the whole ground, and will extend the beds on the side. Cut off the runners at six inches distance from the sides, and then you have a bed three feet wide, covering all the ground. In November the leaves should be cut off with a scythe or reap hook, and there should be a little mouldy manure scattered over them. They will last in this way for many years.

CULTURE OF GRAPE VINES. The best mode of raising the plants is by cuttings taken from the vines at the Fall pruning, and preserved in earth till Spring. These may be made either of one eye or bud, or of four or five, attached to a small portion of the two years old wood, forming a cutting in the shape of a small mallet.

*The 1st year.*—They may be raised in a small nursery bed, prepared of a good light soil—set in the ground six inches distant from each other, with the rows wide enough apart to permit them to be weeded with a narrow hoe; or, they may be put in the first instance, where they are to be reared, and left to grow, at the distance of five, six, or seven feet, or more, according to the wishes of the cultivator. In this latter case there should be three cuttings put into each spot six inches apart, to insure the setting of one. When this is ascertained with certainty, the two weakest may be withdrawn, leaving the rest of the three to grow. If the cuttings be of one eye each, they should be from the last year's growth, and a small piece of the branch an inch long should be left attached to the bud, and extending half an inch on each side of it. These should be planted two inches below the surface with the bud uppermost, and a small stake placed by the side of them that they may not be disturbed. If the cuttings are of several eyes, they should be laid in the ground sloping, leaving one eye level with, or only just above the surface. They should be kept moist, but not wet, as this will rot them. A spot which receives the morning sun till eleven o'clock, and not afterwards, is the best for a nursery bed for them, but for permanency they should be planted where they will receive the sun longest, and in this case they should be shaded at noon day until they have entirely put out. One bud only should be allowed to push from the cutting the first year; the plant should be kept free from weeds; the earth kept light around it, and as soon as the shoot has attained strength enough to produce laterals, they should be rubbed out, and the shoot tied to a small stake, by which means it will gain firmness, and the admission of the sun and air to the shoot will prepare it to bear the frost of the fall, and prevent its imbibing the moisture which it would otherwise be subject to, when covered with earth in the winter. By the first of November, the shoots may be cut down to two eyes, and by the middle of the month, if it be dry

weather, they may be covered over with earth, forming a slope to cast off the wet, and prevent the rains from penetrating—as the drier the plant is kept during the winter, in the better state it will be in the succeeding spring.

*The 2d year.*—The plants should not be uncovered in this climate till the middle of April. Those from the nursery should now be transplanted to the places where they are to remain; a shoot from each eye should be permitted to push, but as soon as you have ascertained which of the two will be the strongest and the best situated, you will preserve that, and rub out the other. The shoot preserved, you will be careful to tie up to a small stake as soon as it has length enough for this purpose, to prevent its being broken by the wind or other casualty. During the summer, the laterals from the four or five lowest buds must be rubbed out, and the shoot be carefully protected, by being kept tied every eight or ten inches.

The next fall, you may cut this shoot down to two buds, (not counting the one in the crotch of the plant between the old and new wood) and cover as before.

*The 3d year.*—You will allow shoots to push from both the eyes, and suffer them to grow, taking care of them as recommended above; but the bud in the crotch must be rubbed out. This year you must rub out the laterals from the five lowest buds, and nip in the other laterals to one eye, so that if the plant grows luxuriantly, the sap may burst from the buds of the laterals, and not from those of the main branch, as it would do if the vine was dressed too close. Be careful to keep the branches tied up, that they may not be broken. In November cut down the two branches as follows; the most feeble of the two, to two buds, to produce wood branches the succeeding season; and the strongest to three buds for fruit branches, and cover them as usual.

*The 4th year.*—If you keep your vines properly dressed, you may have your first fruits without injury to your plants. After this, the system to be pursued must depend on the strength of your vines, and this will depend on the goodness of the soil, and the care you take of your plants. But as a general rule, the following points must be attended to.

1st. The number and length of your fruit branches must always depend on the strength of your plant; the wood branches are always to be cut down to two eyes.

2d. No more branches should be left on the vine than it can nourish well, and abundantly; this will depend on its age, and the soil in which it grows.

3d. The branches should be cut in alternately for wood and fruit branches, observing to cut for wood branches as low down on the plant as possible, so as to renew your wood near the bottom, annually. No shoots should be permitted to grow from the old wood, unless wanted for this purpose.

4th. No more shoots should be permitted to grow, than can be laid in clear and handsome, and without confusion on the trellis, and so as to admit the sun and air freely among the branches.

5th. The laterals should be rubbed out of the wood branches six or eight eyes high, and those that are permitted to remain should be pinched into one bud. The laterals on the fruit branches should be rubbed out from the insertions of the shoot to the uppermost fruit inclusive, and the others pinched in as above. If the shoots are *very* strong, the upper laterals may be allowed to grow, to take up a great portion of the sap; but this should not be done, unless there is danger of the eyes bursting in the main shoots. Be careful always to keep the shoots tied up near their top.

6th. Never leave more than five good eyes on a fruit bearing branch, unless your vine is confined to a narrow space, and you are obliged to preserve only two or three fruit branches; in this case the length of the branch must correspond to the nourishment it will receive from the plant. Select the roundest and fairest branches for fruit, and the lowest and most feeble for wood. The closer the buds are together, or the shorter the joints of the branch, the better they are for fruit; these may in general, be cut to three, four, or five eyes, according to their strength. But in vineries covered with glass, where two fruit bearing branches only are left on strong vines:—twenty, thirty, and forty buds are sometimes left on fruit branches.

The foregoing rules will be sufficient for any one to build up a vineyard sufficiently large to supply himself, his friends, and the market, with grapes. But to promote and forward their maturity and size, the following course may be pursued.

The first of July you will be able to see the state of your fruit, which will be just formed. At this time select the highest fruit branches and those which have the finest appearance of fruit upon them, and perform the following operation on the two years old wood, from which these branches proceed, taking care not to cut below any of the wood branches.

Take a pruning knife with a smooth edge, and hawk's bill, and pass it round the branch where the bark is clear from knots, cutting deep enough to reach the sap wood of the plant; at a quarter or ⅜ of an inch below the first cut, make another, running parallel with the first: then make a perpendicular cut through this section of the bark, the same depth, and you may take out the rim of bark clear from the branch. This will not prevent the sap rising into the upper part of the branch, but it will prevent its descending below the cut, by which means it will be retained in and distributed throughout the upper part of the branch, in a greater portion than it could otherwise be, and the branch and fruit will both increase in size much more than any of those that are not thus treated, and the maturity of the fruit will be advanced very much.

This has been denominated *Girdling*. If the plant is very vigorous, and the season is very favorable, the wound will soon be closed, so that it may be necessary to open it a second time. The process does not injure the plant, as you only girdle the fruit bearing branches, which you would in any case cut out at the fall pruning, to make room for the branches which you have been bringing forward to give you fruit the succeeding year. This may be kept up from year to year, and give you a succession of ripe fruit from the first of September to the close of the season. The fruit on those branches which are not girdled, will

ripen the latest, of course, but neither these, nor those which have been girdled, should be shortened, as is customary on vines not thus treated.

## MANAGEMENT OF BEES.

APIARY. By an apiary is meant a place where bees are kept, which may consist of a stand, shed, or enclosure appropriated for that purpose. This is an important appendage to every farmer's establishment, and a delightful accession to the premises of every horticulturist. The study of the domestic honey bee is eminently calculated to raise our thoughts of the wisdom of the Great Architect who has infused such "skill divine" into so humble an architect as the bee. "Besides, there is no branch of husbandry," says a writer, "the cultivation of which, furnishes for our own table a more innocent and grateful luxury, than that of the bee."

It is not important what be the situation of an apiary, provided it be in a quiet and sheltered place, free from weeds, and within a convenient distance of pasturage, which abounds in trees, shrubs and flowers. Some writers recommend to give an apiary a southern, or south-eastern aspect; but this is considered by no means essential.

BEE. The bee has two large round eyes, one on each side of its head; also, two teeth, by which it constructs its cells, and removes from the hive all obnoxious substances. A little below the teeth, is situated the proboscis, and within the mouth a tongue, which is quite long. It has four wings, and six legs. In the third pair of legs is a singular provision for conveying pollen, or the dust of flowers—viz. two triangular cavities, which are filled, and often more than filled, by means of a kind of brush, on each of the second pair of legs which are used by the bee to brush off the pollen, after she has rolled herself in it, and is thus conveyed to the hive. At the extremity of each foot are fangs, by which the bees strongly attach themselves to whatever they chance to light upon. Honey is collected by means of the proboscis. The stomach consists of two parts, connected by a kind of tube. In the first, or honey stomach, the nectar of the flowers is elaborated into honey; in the second, a portion of the honey undergoes the action of the digestive powers, and serves to sustain the bee. Two antennæ or feelers project forward from the head, which serve to convey to the bees a knowledge of one another, and enable them to conduct the internal operations of the hive, even in the dark. Each swarm consists of three kinds of bees, viz. *females*, *males*, and *workers*, each of which will claim a more particular notice.

### FEMALE OR QUEEN BEE.

Each swarm has one female bee, which takes charge of them, and from this circumstance is usually called the queen bee. She differs from the other bees in that she is about eight lines and a half long, while the males are seven, and the workers only six. Her abdomen is also longer, but her wings are so short, that she flies with difficulty. It is said that she leaves the hive but on two occasions—one, when she leads forth a swarm; the other for the purpose of being impregnated. She

is the only one that breeds, and in her single personage resides the prerogatives of sovereignty, which are most scrupulously acknowledged by all her subjects. She enjoys their uniform affection, and is ever treated by them with the respect due to her exalted station. Some administer honey to her; others attend upon her as if to guard her: while others still, remove from before her any thing which might impede her progress. No sooner are cells constructed by a new swarm, than the queen commences laying her eggs, at the rate of two or three hundred a day; and probably at even a greater rate, according to the rapidity with which the cells are constructed. The cells designed for the production of workers are horizontal and hexagonal; those for the males or drones are more irregular; the queen, or royal cells are circular, and uniformly perpendicular. Workers arrive to maturity from the egg, in twenty days; drones in twenty-four; queens in sixteen. The growth of queens is probably accelerated by the superior attention which they receive, and the richer quality of the food or jelly administered to them. Eggs of each kind are hatched in three days from the time they are deposited. The worms are immediately supplied with pollen, or the farina of flowers, and this supply is continued so long as necessary. Royal cells exist in every hive; but in case of the loss of their queen, workers have the power of effecting a metamorphosis of one of their own species to supply her place. This is done by selecting a worm three days old, and sacrificing three contiguous cells for the purpose of constructing one of royal form and dimensions. The food designed for the royal worm, consists of a kind of paste or jelly, of a pungent taste. Although several queen bees are sometimes brought to perfection about the same time, but one only can hold the reins of government, and she that is strongest, claims this prerogative. No sooner does she mount the throne, than she thirsts for the blood of her royal sisters, and nothing can appease her but their death, which she effects with singular zeal.

Males or Drones. The number of drones in an average swarm, is estimated at about five hundred. They may be easily distinguished from the common or working bees, being both larger and longer. They are destitute of a sting. They make a much greater noise when on the wing, than other bees. Their proboscis is not adapted to collect honey. The precise office of the drones, has been a subject of much dispute; but it seems to be at length conceded that they are males, and serve the purpose of impregnating the queen. When this has been effected, they are of no further use, and are destroyed by the neuters, who sting them to death. They make but little resistance; and, as if they were aware of having accomplished the end of their existence, die without repining. Their destruction is usually accomplished in the months of July and August. In the May following, others are hatched to supply their place.

Working Bees or Neuters. This kind of bee constitutes the great majority in every swarm. "The average number in a swarm or hive," says a writer, "is from fifteen to twenty thousand bees. Nineteen thousand four hundred and ninety-nine are neuters or working bees, five hundred are drones, and the remaining one is the queen, or mother. About five thousand bees weigh a pound. Hence it is easy to determine the number of bees in any given swarm by ascertaining the

difference in weight between the hive and the bees after they are hived.

The business of the workers consists chiefly in constructing the cells, and collecting honey. The labor of the hive is apportioned to several classes, though they not unfrequently change work. One class is employed in attending upon the sovereign; another cleans the hive and prepares it for the comb; some gather a resinous substance called *propolis*, or bee glue, with which they seal the crevices of the hive; others construct the cells; others, still, bring home honey, and where necessary, pollen for the young, and a small number act as sentinels, both by day and by night at and around the entrance of the hive.

The industry of the bee is proverbial. They labor from morning's early dawn till evening, and a young swarm may be found working at the cells even in the night. The quantity of honey conveyed by a single bee at a time is but a small drop; but the aggregate collected by a swarm in a single season, if favorable, is surprisingly great. Of a population of 18,000, it has been ascertained that 3000 return from their collections in a single hour. Swarms not unfrequently accumulate from 60 to 100 pounds in a single season.

SWARMING. Bees seldom swarm until they become overstocked, when the younger portion are compelled to go forth and seek a habitation for themselves. Yet, as the young queen may be supposed inadequate to conduct the new colony, she is left to reign over the old stock, and the old queen leads forth the young swarm. Before her departure, however, she deposites eggs for queens and drones.

Bees seldom swarm before May or after July. The earlier swarms are generally esteemed of greater value. No signs which are infallible precede the departure of the colony. Yet it is said that on the evening previous, the queen is heard to make a peculiar kind of humming, called *tolling* or calling. The more certain indications, however, are the appearance, for some days, of some thousands of bees on the outside of the hive in an inactive state, and the sudden ingress of the whole on the morning of some fair day. They may then be supposed to be laying in a stock of provision from the parent hive preparatory to their journey.

On the appearance of a swarm, experience has proved the utter inutility of beating on pans, or the ringing of bells. A few handfuls of sand or earth, or some jets of water will more effectually settle them than the jargon of a thousand voices, or the deafening clatter of a thousand kettles. Should the swarm rise high and indicate a determination to take a long flight, the experiment of firing a few guns loaded with peas or beans at them might well be made. Not unfrequently the queen, unable to fly, falls to the ground a few rods only from the hive. In such a case, if discovered, she may be carefully taken and placed immediately under the hive, which must be a little raised, and the swarm will settle about her. If by any means she is seriously disturbed at the time of swarming, she returns with her subjects to the parent hive, from which she may be expected to issue in two or three days. Should she be lost, the swarm will return, and generally again come forth in a fortnight, in which time a new queen will have been brought to perfection.

BEES.

HIVING. A few hives should always be in readiness and should be made of nice boards and be made perfectly tight. This will save the bees much toil, as every crevice must needs be stopped, and every particle of extraneous matter removed before the comb is commenced.

It is usual to rub the hive previously to hiving a swarm, with a solution of salt, or with some aromatic herbs; but if otherwise clean, all such practices are unnecessary. A sprinkling of milk and molasses may be acceptable.

Bees may be hived by cutting off the limb on which they have alighted; or they may be shaken into the hive, if the limb be so small as to admit of sufficient agitation to dislodge the bees at once. Should a swarm settle in some inconvenient place, they may be carefully *brushed* into the hive. Should the swarm return to the tree, after hiving, it may be again hived; but after a second experiment, it will be judicious to substitute another hive.

When a swarm, on issuing, divides, and settles on a tree in two separate clusters, the *presumption* is that each cluster has its queen. If not large, or the season be advanced, it will be well to put them into one hive, and leave the queens, if there be two, to settle which shall occupy the throne.

Bees are less inclined to sting during swarming, than at other times; yet prudence will suggest the propriety of a covering for the face and hands of those who may be employed in hiving them. Millinet will answer well for the face and neck, and a pair of woolen or leather gloves for the hands.

It is sometimes desirable to unite swarms, especially if they be small. This may be easily effected by spreading a cloth on the ground in the evening, on which the hive containing one of the swarms is to be placed, taking care to raise it a few inches by means of a stick. In this situation a few smart strokes upon the hive will cause the bees to drop in a cluster. At this moment the hive containing the other swarm should be placed over them; into this they will readily ascend and take up their permanent abode.

WAX WORKER.

WAX. In order to build the beautiful combs which every one must have repeatedly seen and admired, it is indispensable that the architect bees should be provided with the materials—with the wax, in short, with which they are principally formed. It was formerly the opinion of even eminent naturalists, that wax was in some way elaborated from the pollen of flowers. This is now known to be incorrect. The wax having been found to be a secretion from muscular rings, around the second stomach of the bee, which resembles a cask covered with hoops. It is within these rings that the wax is produced, but the secreting vessels for this purpose have hitherto escaped the researches of the acutest naturalists. Huber, however, plausibly enough conjectures that they are contained in the internal lining of the wax pockets, which consist of a cellular substance reticulated with hexagons. The wax pockets themselves, which are concealed by the over-lapping of the rings, may

be seen by pressing the abdomen of a working bee so as to lengthen it, and separate the rings further from each other. When this has been done, there may be seen on each of the four intermediate h[illegible] of the belly; and separated by what may be called the keel (*carina*) two whitish colored pouches, of a soft texture, and in the form of a trapezium. Within, the little scales or plates of wax are produced as occasion requires. We may remark that it is chiefly the wax workers which produce the wax, for though the nurse bees are furnished with wax pockets, they secrete it only in very small quantities, while in the queen bee and the males or drones, no pockets are discoverable. It may be supposed that if the substance found lying under the rings be really the elements of wax, it undergoes some subsequent preparation after it is detached; and that the bees, in short, are capable of impregnating it with matter, imparting to it whiteness and ductility, whereas in its unprepared state it is only fusible.*

PROPOLIS. Wax is not the only material employed by bees in their architecture. Besides this, they make use of a brown, odoriferous, resinous substance, called *propolis*, more tenacious and extensible than wax, and well adapted for cementing and varnishing. This it appears from satisfactory experiments made by Huber and others, is obtained from the wild poplar, and probably from other trees. The use of this appears to be to fill up such interstices as may happen to exist in the cell, and to serve as a varnish for any place which may require it. But this is not the only use to which bees apply the propolis. In case of the ingress into the hive, of insects which they are unable to drag out with their teeth, having killed them, to prevent the noxious smell which would arise from their putrefaction, they immediately embalm them by covering every part of their body with propolis, through which no effluvia can escape. When a snail, with a shell, gets entrance, to dispose of it in this way gives much less trouble and expense to the bees. As soon as it receives the first wound from a sting, it naturally retires within its shell. In this case, the bees instead of pasting it all over with propolis, content themselves with glueing all round the margin of the shell, which is sufficient to render the animal forever immoveably fixed.

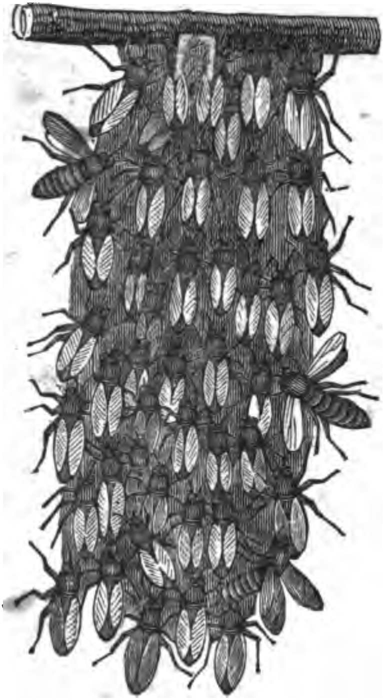
THE BUILDING OF THE CELLS.. When bees begin to build the hive, they divide themselves into bands, one of which produces materials for the structure; another works upon these, and forms them into a rough sketch of the dimensions and partitions of the cells. All this is completed by the second band, who examine and adjust the angles, remove the superfluous wax, and give the work its necessary perfection, and a third band brings provisions to the laborers, who cannot leave their work. But no distribution of food is made to those whose charge in collecting propolis and pollen, calls them to the field, because it is supposed they will hardly forget themselves; neither is any allowance made to those who begin the architecture of the cells.

The secretion of wax, it would appear, goes on best when the bees are in a state of repose; and the wax workers accordingly suspend themselves in the interior in an extended cluster, like a curtain, which is composed of a series of intertwined festoons, or garlands, crossing

* Library of Entertaining Knowledge.

each other in all directions,—the uppermost bee maintaining its position by laying hold of the roof with its fore legs, and the succeeding one laying [illegible] of the hind legs of the first. Here is a curtain of wax workers secreting wax.

CURTAIN OF WAX WORKERS SECRETING WAX.



The manner in which the bees hold on to one another may be still more distinctly apprehended by the following cut:

As the wax workers secrete only a limited quantity of wax, it is indispensably requisite that as little as possible of it should be consumed, and that none of it should be wasted. "Bees, therefore," as M. Reaumer well remarks, "have to solve this difficult geometrical problem:—A quantity of wax being given to form of it similar and equal cells of a determinate capacity, but of the largest size in proportion to the quantity of matter employed, and disposed in such a manner as to occupy the least possible space in the hive. This problem is solved by bees in all its conditions. The cylindrical form would seem to be best adapted to the shape of the insect, but had the cells been

cylindrical, they could not have been applied to each other without leaving a vacant and superfluous space between every three contiguous cells. Had the cells, on the other hand, been square or triangular, they might have been constructed without unnecesary vacancies, but these forms would both have required more material and been very unsuitable to the shape of a bee's body. The six-sided form of the cells obviates every objection; and while it fulfils the conditions of the problem, it is equally adapted with a cylinder to the shape of the bee's body."

CURTAIN OF WAX WORKERS.

Honey is a vegetable secretion, which bees gather with their long tongue and proboscis from flowers. It is swallowed into the first or honey stomach, whence it is disgorged by the mouth into the cells on their return to the hive. The best honey is said to be of a whitish color inclining to yellow. "As an article of food," according to Dr. Thacher, "when immediately used, it is pernicious to weak stomachs, in which it readily ferments and occasions flatulency. It possesses however, salubrious properties; as a medicine, it is a very useful aperient and expectorant, especially when it has been boiled, in which state it may be used with safety and advantage by asthmatic patients to promote expectoration of tough phlegm." The trees which afford honey in the greatest abundance are the different species of willow, maple, and chestnut, white mulberry, peach, apple, palm and cherry tree. Of shrubs and plants we may name the strawberry, raspberry, mignonette, thyme, crocus, and white clover. The blossoms of the red clover and honey suckle yield honey in abundance, but it lies beyond the reach of the bee. Buckwheat contains more than most plants; but it is less palatable. It answers well for winter stores for the bees, and of no kind are they more fond.

Bee Bread, as already noted, is the pollen or dust of flowers, collected by the bees in the manner before described. Its only use appears to be for feeding the young, to which it is administered by the workers, grain by grain.

Hives. Until within a few years little attention has been paid to the construction of hives. A few boards put together at the moment of

necessity, were all that were deemed essential. They were, perhaps, covered with dirt and full of flaws and cracks, to remedy which inconveniences would require the industry of the new colony some days, if not weeks. More enlightened views are now entertained on this subject, and much ingenuity has been exercised in constructing tenements for bees to render them comfortable—to secure them from the invasion of the bee moth, and to admit of the superabundant honey being removed without injuring or disturbing the bees. For a luminous view of this subject we would refer our readers to the excellent practical treatise on Bees by Dr. Thacher, published in Boston.

It is with pleasure that we introduce the following account from the North American Review, for June 1828, of a hive invented and successfully employed for a number of years, by Mrs. Mary Griffith, of New Brunswick, N. Y., which is likely, according to that journal, soon to supersede every other now in use.

"The Charlieshope hive, is thirteen inches square at the top; *but as the sides decrease in width to the bottom* the base is narrower, being only seven inches on the flanks, and thirteen inches in front and at the back. The hive is in height about twenty-six inches in front, and twenty behind. Of course the floor is an inclined plane. It is fastened behind with hinges, and at the sides with hooks and staples. The roof or cover is, like the rest of the hive, made of common inch board, with cleats screwed on the top, to prevent it from warping; the top is screwed to the hive in two places; three holes are bored in this cover of one inch diameter, and about a quarter of an inch apart, on a line with each other and parallel with the front of the hive; three holes are found to be necessary, as the bees would otherwise build in such a manner as to close them and prevent their ascent to the upper box, when that becomes necessary.

"The under part of the top or cover is *rough*, as the propolis, or bee glue, does not at all times adhere sufficiently well to a smooth surface.

"Every other part of the hive is as smooth as possible, and the whole hive, box and all, is well made and joined. The upper box is thirteen inches square and the width of a board deep, from eight to ten inches. The box is likewise smoothly planed, excepting the inside of the top board, which is rough.

"The box sits snugly on the top of the hive; and the cleats are placed in such a manner on the upper surface of the cover as to fix the box firmly.

"When it is ascertained that the hive is full of honey, the plugs in the three holes are taken out. The bees may then ascend, and if the season be favorable, they will fill the box with comb and honey.

"About three or four inches from the top of the front and back of the hive, are two cleats which serve to sustain the hive in a moveable frame, made of narrow slats of wood, which enables any one to carry the hive from one place to another, as the hiving and other operations make it necessary. The hives are likewise suspended on permanent joists or scantlings of the apiary. Hives thus suspended, are out of the reach of mice, and they are also better on a variety of accounts. The opening and shutting of the floor allows of daily inspection.

The floor can be cleaned often. The inclination of the sides and bottom allows the perspiration of the bees to flow off rapidly.

"This is a great point gained, as dysenteries are induced by the absorption of such acrid matter. The slope of the floor enables the bees to remove all extraneous matter, and to defend themselves from robbers and intruders. The entrance to the hive is about three inches wide, and half an inch high. A door of wire, the meshes of which are small enough to prevent the entrance of the miller, rests behind two door posts made of needles. These needles are driven into the floor, close to the entrance. The little doors are always put behind the needles, as soon as the bees are in for the night, and are removed at day light. About the middle of April, the doors are first used, and they are discontinued in about two months.

"After the middle of June, the floors are let down, and are suffered to hang until day light, when they are gently raised, and hooked up. The floor of the hive projects in front about three inches, thus forming an apron or platform, on which the bees alight, before they enter in at the little door."

Bee Moth. This is the great foe of the honey bee—one which neither the instinctive powers of self preservation with which the bee is endued, is able to resist, nor the ingenuity and skill of man are able effectually to provide against. And to the depredations of this single enemy is to be attributed the indifference which obviously prevails as to attempts, on an extended scale, to foster this industrious race.

We are among those who entertain the belief that no effectual remedy will soon be found for the evil here alluded to; at least, none which will admit of so universal and easy application as to induce any great numbers in our land to turn their attention to the cultivation of bees. Still, something may be done.

Before proceeding to the few suggestions which we design to make, a brief description of the bee moth may be proper. It appears in the form of a small miller, of a greyish color, pale towards the head, of a glossy brown near the outer margin of the wings. It has four wings, but is little disposed to fly much. It begins to molest bees about the middle or last of April, and continues its persecutions till September. Its depredations are chiefly committed towards the close of the day, and during the night. Their eggs are deposited either in the hive itself, or in the crevices round about it. These eggs are hatched in a few weeks, and produce a grub or worm with a reddish head, which finds its way into the hive, where, having fortified itself by means of a web, it feeds upon the wax, comb, eggs, and young brood of bees, and continues to extend its ravages with a Goth and Vandal spirit, until the whole internal establishment becomes one wide spread desolation.

To prevent entirely the depredations of these enemies, is probably impossible. Their injurious effects, however, may, in a measure, be prevented, by destroying the millers, which may be effected in a degree by placing open shallow vessels near the hives, containing sweetened water and vinegar. By sipping this liquor, of which they are fond, they become intoxicated and drown. Some recommend to sprinkle spirits of turpentine around the hives; others recommend closing the entrance of the hive, after the ingress of the bees, and opening it early

in the morning. It has been suggested by a respectable writer, to place the hives on the naked ground, or which is thought still better, to cover the floor of the bee house with earth about two inches in depth. This last method is recommended by way of experiment, by Dr. Thacher, in the work to which we have already alluded, and to which we would refer our readers for other important hints on this particular topic, as well as for numerous suggestions in reference to the general management of bees.

# PART VII.

## ARTS OF LOCOMOTION—OF HEATING, VENTILATION, &C.

### LOCOMOTION.

Motion of Animals. "The chief obstacles which oppose locomotion or change of place," says Dr. Bigelow,* "are gravity and friction, the latter of which is in most cases, the consequence of the former. Friction is obviated by animals that walk, by substituting points of their bodies, instead of large surfaces, and upon these points they turn, as upon centres, for the length of each step raising themselves wholly, or partly from the ground in successive arcs, instead of drawing themselves along the surface. The line of arcs which the centre of gravity describes, is converted into an easy or undulating line, by the compound action of the different joints. As the feet move in separate lines, the body has also a lateral, vibratory motion. A man, in walking, puts down one foot before the other is raised, but not in running. Quadrupeds, in walking, have three feet upon the ground for most of the time; in trotting, only two. Animals which walk against gravity, as the common fly, the tree toad, &c., support themselves by suction, using cavities on the under side of their feet, which they enlarge at pleasure, till the pressure of the atmosphere causes them to adhere. In other respects, their locomotion is effected like that of other walking animals. Birds perform the motion of flying, by striking the air with the broad surface of the wings in a downward and backward direction, thus propelling the body upward and forward. After each stroke, the wings are contracted, or slightly turned, to lessen their resistance to the atmosphere, then raised and spread anew. the downward stroke, also, being more sudden than the upward, is more resisted by the atmosphere. The tail of birds serves as a rudder to direct the course upward or downward. When a bird sails in the air without moving the wings, it is done in some cases by the velocity previously acquired, and an oblique direction of the wings upward; in others, by a gradual descent, with the wings slightly turned in an oblique direction downward. Fishes in swimming forward, are propelled chiefly by stokes of the tail, the extremity

* Elements of Technology, p. 172.

of which being bent into an oblique position, propels the body forward and laterally at the same time. The lateral motion is corrected by the next stroke, in the opposite direction, while the forward course continues. The fins serve partly to assist in swimming, but chiefly to balance the body, or keep it upright; for the centre of gravity being nearest the back, a fish turns over, when it is dead or disabled.* Some other aquatic animals, as leeches, swim with a sinuous or undulating motion of the body, in which several parts at once are made to act obliquely against the water. Serpents in like manner, advance by means of the winding or serpentine direction which they give to their bodies, and by which a succession of oblique forces are brought to act against the ground. Sir Everard Home is of opinion that serpents use their ribs in the manner of legs, and propel the body forward by bringing the plates on the under surface of the body to act successively like feet against the ground.† Some worms and larvæ of slow motion, extend a part of their body forwards, and draw up the rest to overtake it, some performing this motion in a direct line, others in curves."

"When land animals swim in water, they are supported, because their whole weight, with their lungs expanded with air, is less than that of an equal bulk of water. The head, however, or a part of it, must be kept above water, to enable the animal to breathe, and to effect this, and also to make progress in the water, the limbs are exerted in successive impulses against the fluid. Quadrupeds and birds swim with less effort than man, because the weight of the head, which is carried above water, is, in them, a smaller proportional part of the whole, than it is in man."

HUMAN STRENGTH, *or power.* Desaguilliers‡ states that the power of a man, applied in various ways, will produce the following results:

A man can raise by a good common pump, a hogshead—63 galls.—of water 10 feet high in a minute, for a whole day.

A man of ordinary strength can turn a winch with a force of 30 pounds, and with a velocity of 3½ feet in a second, for ten hours a day.

Two men, working at a windlass, with handles at right angles, can raise 70 pounds more easily than one can raise 30.

According to Mr. Buckman's comparison, the force exerted in turning a winch being made equal to the unit or standard,

| | | |
|---|---|---|
| The force as in pumping will be | = | .61 |
| as in ringing, | = | 1.36 |
| in rowing, | = | 1.43 |

Porters are commonly able to carry from 200 to 300 pounds at the rate of 3 miles an hour.

* The swimming bladder, which exists in most fishes, though not in all, is supposed to have an agency in adapting the specific gravity of the fish to the particular depth in which it resides. The power of the animal to rise or sink, by altering the dimensions of this organ, has been, with some reason, disputed.

† Lectures on Comparative Anatomy, vol. i. p. 116, &c. Sir E. Home deduces this fact from the anatomy of the animal, and from the movements which he perceived, in suffering a large coluber to crawl over his hand. The ribs appeared to be raised, spread, carried forward, depressed and pushed backward, successively.

‡ Allen's Mechanics, p. 150.

By a careful adjustment of the weight low upon the hips, it is stated that porters are able to move forward under a weight of from 700 to 900 pounds.

Coulomb observes that the most advantageous weight, for a man of common strength to carry horizontally, is 111 pounds; or if he return unladen, 135 pounds. With wheel-barrows, men will do half as much more work as with hods, as in the mode previously mentioned.

Surprising accounts are given of the strength of men to sustain weights of above 2000 lbs. by means of a proper apparatus adjusted to the hips. The weights, however, in the cases stated, do not appear to have been sustained by muscular strength, but merely by placing the legs in the most favorable perpendicular position, whereby the bones receive the whole stress, with but little more muscular exertion than is required for maintaining them in an erect posture. The bones of the legs and the arch of the pelvis, although apparently so frail in form and texture, are constructed with such admirable science, that it is supposed by anatomists they might sustain a weight of nearly 4,000 pounds.

Aids to Locomotion. Although the bodily strength of man, according to the preceding article, would enable him to accomplish much, without mechanical contrivance, yet it is easy to perceive that independent of that contrivance, but little comparatively could be effected, either as to moving himself, or conveying the more ponderous articles of commerce great distances, in any moderate space of time. The aids to locomotion, discovered by the ingenuity of man, are quite numerous. We shall find room to notice but a few, and those quite briefly:—

Wheels. Wheels are designed to diminish friction, and also to surmount obstacles or inequalities of the road, with more advantage than bodies of any other form in their place could do. The friction being transferred from the surface of the ground to the centre of the wheel, is lessened in the proportion which the diameter of the axle-tree bears to the diameter of the wheel. The rubbing surfaces, also, being polished and oiled, are in the best possible condition to resist friction. The best composition for diminishing friction, is said to be common soap stone, or *steatite*, reduced to powder and mixed with oil. One part of black lead to three parts of lard, forms also a good anti-attrition compound.

The principle upon which a wheel easily surmounts the common obstacles found in the road, is obvious. It is converted into a lever, by means of which the load is lifted with greater ease, and its centre of gravity passes over in the direction of an easy arc, the obstacle furnishing the fulcrum on which the lever acts.

From this last remark, it might in truth be inferred that the ease with which wheels surmount stones and similar obstacles, is in proportion to their size. This arises from the well known principle, that the longer the arm of the lever is, on which a given force acts, the greater is the result. It may also be added in favor of large wheels, that they sink less in soft ground than small ones, and are less liable to wear out; since, in passing over a given space, they turn round a proportionably less number of times. A wheel which is three feet in diameter will turn round twice, while a wheel which is six feet in diameter, turns but once. Hence, the tire of the former must come in contact with the ground

twice as often as that of the latter. It may be mentioned as a diminution of the advantages of large wheels, that in order to preserve the requisite strength, they are necessarily cumbersome, and too heavy for use. But could this objection be obviated, a limit must be assigned for the size of carriage wheels, which is that the axle should not be above the level of the draught, or breast of the horse. Indeed, in practice, it is found expedient to place the point of draught somewhat lower than the middle of the horse's breast. According to Dr. Gregory, a power which moves a sliding body along a horizontal plane, acts with the greatest advantage, as far as friction is concerned, when the line of direction makes an angle of about 18½ degrees with the plane. M. Deparcieux states from experiments with carriages, that the angle made by the trace with a horizontal line, should be one of 14 or 15 degrees.

*Broad Wheels.* Much has been written on the comparative utility of wheels, which have a broad, or a narrow rim. The advocates for the former kind of wheels, urge, that they pass more easily over ruts and holes, and sink to a smaller depth in soft and sandy roads. Hence, while narrow rimmed wheels render a road uneven, by causing deep and narrow ruts, the broad constantly act as rollers upon the surface. The principal objections to broad wheels are, their greater weight, greater expense, and the greater number of obstacles which they meet in their passage.

*Form of Wheels.* Were roads in all cases level and smooth, the proper form of wheels would obviously be an exact cylinder, with their spokes set precisely parallel to the same plane. But experience has proved the advantage of wheels which are somewhat conical or *dishing*. In this case, when, by reason of an inequality in the road, the weight of the carriage is chiefly thrown on one wheel, the spokes on the under side of that wheel becoming more nearly *vertical*, are better able to sustain the increased pressure. A further advantage presented by this form of wheels is, that the circumference being farther from the body of the carriage, less mud is thrown upon it, and the passengers are less annoyed. The chief objection to this form of the wheel, is presented in an increase of friction, it being found that the degree of lateral motion and friction increases in proportion, as the wheel is conical or dishing.

MODE OF ATTACHING A HORSE. In cities, it is the general custom, growing probably out of the circumscribed limits of wharves, which draymen much frequent, and the narrowness of the alleys through which they pass, to harness draught horses before each other, in a single line. This, is however, a bad mode of attaching horses, since only the shaft horse has an advantageous line of draft. The other horses draw nearly in a horizontal line, and of course to a disadvantage. Besides, the foremost horses, drawing at the ends of the shaft, do not act directly upon the load, but expend a part of their force in a vertical pressure upon the back of the shaft horse. A better mode of attaching horses, is to make them work abreast—since they are then in the same line of traction, and are equally near to the load.

RAIL ROADS. By the term rail road, is understood a road formed by laying distinct tracks of timber, iron, or stone, for wheel carriages to run upon. They are of modern invention. The earliest rail roads were con-

structed of wood only. Stone is sometimes employed, but iron only should be used where durability is expected.

Iron rail roads are of three kinds—the Edge rail—the Tram road—and the Single rail.

In the edge rail way, the rails, as indicated by the term, are laid with the edge upwards, and the carriage is retained upon them by a *flange*, or projecting edge, attached to the wheels instead of the rail. Tram roads are flat rails, usually made of cast iron, with an elevated edge or flange on one side, to guide the wheels of carriages in their path. Tram rails are weaker than edge rails, and it is sometimes necessary to strengthen them with ribs underneath. In the single rail way, the carriage consists of two boxes suspended on each side of the rail by an iron frame, and having two wheels placed one before the other.

Where the amount of travel is very great, the rail road is double, one set of tracks being designed for carriages moving in each direction. A single road, however, is generally sufficient, if it be provided with double places, called *sidelings*, for carriages to pass each other at convenient distances.

Horses are commonly employed for drawing loads upon rail ways, and it is estimated that a horse will draw eight times as much upon a rail way, as upon a common road. Within a few years, steam engines have been employed for propelling carriages, especially in England, by means of which, the most surprising velocity is with perfect security attained.

Rail Roads in the United States have not been attempted to any considerable extent: yet several are in contemplation, and it can scarcely be doubted, but that in a few years this mode of conveyance will be extensively adopted, and in preference to canals.

In England, rude tram roads, constructed of wood, were in use nearly two centuries ago; but the present improved mode of constructing and laying the rails with iron is of very recent date. The first rail road established by act of parliament was the Stockton and Darlington, a distance of twenty-five miles. The act was obtained in 1823, and the road was opened in September, 1825. It consists of a single line of rails, with sidelings every quarter of a mile, for carriages to pass each other. It is principally used for the conveyance of coals and travellers.

Still more recently, the important and stupendous undertaking of constructing a rail road from Liverpool to Manchester, a distance of something more than thirty miles has been completed. The interest excited in this rail way has arisen chiefly from the excavation of a tunnel, some account of which must be interesting to our readers.

This tunnel commences at Wapping, near the Queen's Dock, and extends under the town of Liverpool, a distance of 2[illegible] yards, or rather more than a mile and a quarter. It was constructed in seven or eight separate lengths, each communicating with the surface by means of perpendicular shafts. The opening at Wapping is by cutting 22 feet deep, and 46 wide. The whole length of the tunnel is white-washed; and lighted by gas, and the effect produced is very singular and picturesque; but the atmosphere is cold and chill, and the vapor is at times so thick, that the mere spectator of this monument of human la-

bor and ingenuity will generally be satisfied with one visit, and not be tempted to repeat it. On the sides of the tunnel, at short distances are placed *lettered* boards, for the purpose of informing the visiter what part of the town he is then under. The distance from the roof to the surface of the ground above varies from 5 to 70 feet. The rails used on this road are made of forged iron, in lengths of five yards each, and weigh 35 lbs. per yard. Every three feet, the rails rest on blocks of stone, let into the ground, containing each nearly four cubic feet. Into each block, two holes six inches deep and one inch in diameter are drilled; into these are driven oak plugs, and the cast iron chairs or pedestals into which the rails are immediately fitted, are firmly spiked down to the plugs, forming a structure of great solidity and strength. On the embankments, where the road may be expected to subside a little, the rails are laid on oak sleepers. For eighteen miles of the road, the rails are placed on stone blocks, and for the other thirteen on sleepers. The double line of rails for the carriages are laid down with mathematical correctness, and consist of four equidistant rails, four feet eight inches apart, about two inches in breadth, and rising about an inch above the surface. In the formation of the railway there have been dug out of the different excavations, upwards of three millions of cubic yards of stone, clay, and soil, and the weight of the double lines of rail laid down is more than 4000 tons.

For the purpose of giving to our readers some conception of a steam carriage, designed to be used either on a rail road, or on the common high way, our engraver has copied the model of such a carriage, not long since exhibited at London.


A, Water Cistern—B, the Boiler—C, Steering Wheel, with the Conductor—D, Steel Frame which carries the Boiler—E, the curved Steam Pipe, to supply the engines—F, Hand Pump and Pipe to fill the Boiler—G, Safety Valve—H, Notice Cocks—I, Eduction Pipe to take the steam from the Engine to the Chimney—K, the Crank—L, the Pan for the Cylinders.

## AIDS TO LOCOMOTION.

The subject of Rail Roads is exciting much interest at the present time in the United States. Several short ones are already constructed; one of greater length, extending from Albany to Schenectady, is completed, and others still are in contemplation, and will, doubtless, in due time be completed.

STEAM ENGINE.—The steam engine, now extensively employed as an aid to locomotion on rail roads and in steam boats, as well as to assist in the mechanic arts, is generally attributed to the Marquis of Worcester as the inventor; but the perfecting of it belongs to James Watt, a native of Greenock, in Scotland. The improvements made in the construction of the steam engine, within the last five and twenty years, are too numerous to be here described. We must content ourselves with giving our readers a brief description and a representation of a modern steam engine, which may of course be constructed of any required power, and applied to any purpose.

In the following representation, A represents a wrought iron boiler, about three parts filled with water; the bottom is considerably, and the sides a little concave, that it may receive more fully the force of the flame circulating around it. Boilers are usually of an oblong form, and are furnished with a part that takes off, in order that a person may get in to clean them when needful; they have also a valve called the safety valve, opening upwards, which is loaded so that the steam escapes when it is stronger than the engine requires, and, if retained, would hazard the bursting of a boiler. It is not uncommon to have two boilers, one of which is a reserve, that the engine may not be stopped, when the other requires repair.

B, is an apparatus for regulating the fire, and giving action to a bell, which regulates the quantity of coals and time of firing.

C, the steam pipe from the boiler A, to the valve I.

D, the steam cylinder, generally called only "the cylinder;" it is connected at the top and bottom with the valve I.

E, the piston which, by its connecting rod *e*, gives motion to the beam F, the other end of which by another connecting rod, gives motion to the heavy fly wheel G, by means of a crank. Thus, after the engine has begun to work, its power is accumulated in the fly wheel, and may be disposed of at the pleasure of the machinist.

H, an eccentric circle on the axle of the fly wheel G; it gives motion by its levers, to the valve I.

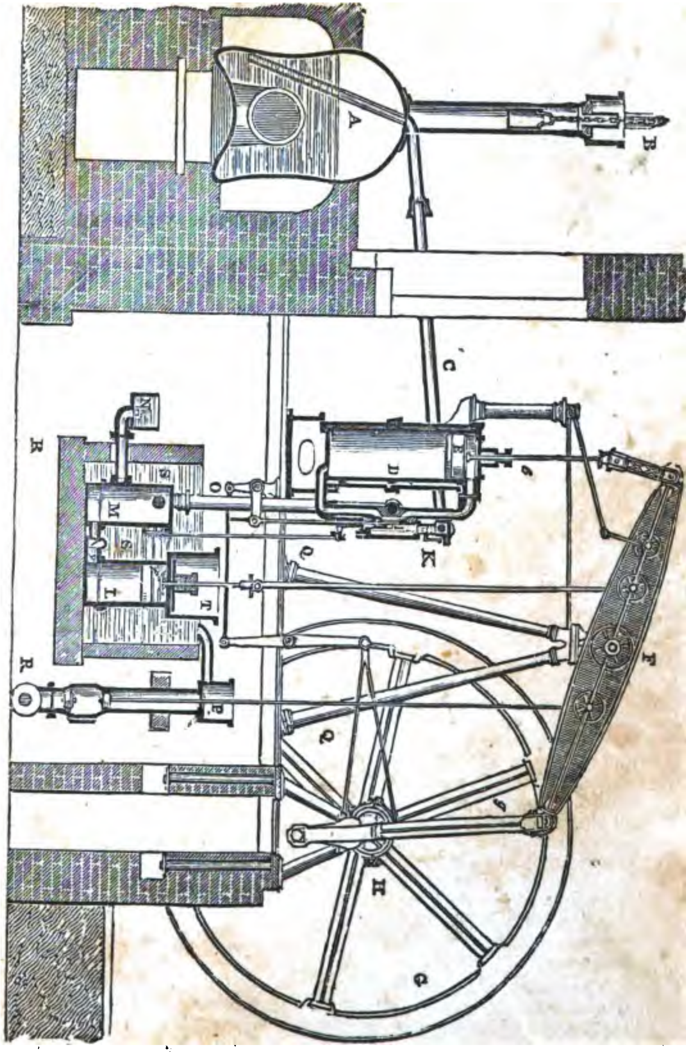
I, a co[illegible] slide valve, which requires no packing to make it steam-tight, as there is always a vacuum under it; it answers the purpose of the four valves used in double-power engines, and from the simplicity of its construction, when well made at first, is not liable to get out of order.

K, the steam admission valve and lever, connected with a governor, which regulates the speed of the engine.

L, the cylinder of the discharging pump, for extracting the water and uncondensed vapor from the condensor M.

N, a small cistern, filled with water. Into this cistern enters a pipe from the condensor M, the top of which pipe is covered with a valve, which is called the blow valve, sometimes the shifting valve. Through

## STEAM ENGINE.



this valve the air contained in the cylinder D, and passage from it, is discharged, previously to the engine being set in motion.

O, the eduction pipe, which conducts the steam from the valve I, to the condenser M.

P, the pump which supplies with water the cistern SS, in which the condenser and discharging pump stand.

QQ, iron columns, of which the engine has four, although only two are shown; they stand upon one entire plate, seen edgeway, on which the principal parts of the engine are fixed; by this means, the beam and its accompaniments are supported, without being connected with any part of the building, except the recess below the floor on which they stand.

RR, the recess below the floor, for containing the cistern of the discharging pump, condenser, &c. This arrangement enables those engines to be fixed up and tried at the manufactory, before they are sent off, which renders the refixing easy and certain.

Before the engine is set to work, the cylinder D, the condenser M, and the passage between them are filled with common air, which it is necessary to extract. To effect this, by opening the valves a communication is made between the steam pipe C, the space below the piston in the cylinder D, the eduction pipe O, and the condenser M. The steam will not, at first, enter the cylinder D, or will only enter it a little way, because it is resisted by the air; but the air in the eduction pipe O, and the condenser M, it forcibly drives before it, and this part of the air makes its exit through the valve and water in the cistern N. The steam admission valve is now closed, and the steam already admitted is converted into water, partly by the coldness of the condenser M, but principally by a jet of cold water which enters it through a cock, opening into it from the well SS, in which the condenser is immersed—When this steam is condensed, all the space it occupied would be a vacuum, did not the air in the cylinder D expand, and fill all the space the original quantity of it filled; but by the repetition of the means for extracting a part of the air, the remainder is blown out, and the cylinder becomes filled with steam alone. Suppose then the cylinder beneath the piston to be filled with steam, and the further admission of steam to that part of it be cut off, while the communication between it and the condenser remains open, it is obvious that there will soon be a vacuum in the cylinder, because as fast as the steam reaches the condenser, it is converted into water by the coldness of that vessel, and the jet playing within it. At this moment, therefore, the steam is admitted above the piston, which it immediately presses down. As soon as the piston reaches to the bottom of the cylinder, the steam is admitted to the under side of it; and as the communication from the upper side of the piston to the condenser is opened, while the further admission of steam to that side during the upper stroke, is prevented, the steam which had pressed the piston down, passes into the condenser, and is converted into water.

The motion of the piston E, by this alternate admission and extraction of the steam on each side of it, is thus necessarily continued, and the distance of its upward and downward range is called the length of its stroke. It communicates its reciprocating motion, by the connect-

ing rod *e*, to the great beam F, and thence, by another connecting rod and a crank, to the fly-wheel G.

To explain the rapid accumulation of power with an increase of the size of the engine, it must be observed that the force of the steam generally used is somewhat greater than the pressure of the atmosphere; but supposing it to be no greater, as the atmospheric pressure is fifteen pounds on each square inch, a piston 16 inches in diameter, containing 201 square inches of surface, will alternately be raised and depressed by a force equivalent to a weight of 3015 pounds. Here no allowance is made for friction, but after the requisite deduction on this account, which may be reckoned at one third, the disposable part of the engine, derived from each stroke, will still be very great.

The condenser M, and the discharging pump L, communicate by means of a horizontal pipe containing a valve *y*, opening towards the pump; the piston *l*, of this pump, also contains two valves, and the cistern T, at the top of the pump cylinder, contains other two valves, which, like those of the piston *l*, open upwards. When the piston E, of the cylinder is depressed, the piston *l*, of the discharging pump, it will be obvious to inspection, is depressed likewise, and its valves open, while the valve *y*, closes; hence the water from the condensed steam, as well as the injection water, and any permanent elastic vapor or gas, which may be present, having passed through the valve *y*, passes through the piston *l*, and when that piston is drawn up, its valves close, and prevent their return, as in ordinary pump work. The water and gas that have thus got above the piston, as the latter rises, open the valves at the bottom of the cistern T, in which the water remains till it is full, but the gas passes into the atmosphere. As the water in the cistern T, is in a very hot state, it is sometimes, for the purpose of economizing fuel, pumped up, and returned to the boiler, the pump rod being attached to the great beam. The utility of the discharging pump L, will now be appreciated, and it must be perceived how much more materially it contributes to the perfection of the vacuum in the cylinder D, than if the water from the condenser merely ran off by a pipe.

The steam constantly rushing into the condenser M, has a perpetual tendency to heat that vessel, as well as the water of the cistern SS, in which it stands; the whole of the steam, if this were unchecked, would not be condensed, or the condensation would not be sufficiently rapid, because the injection water itself flows out of this cistern. A part of the water is therefore allowed to flow from this cistern by a waste pipe, and an equal quantity of cold is constantly supplied by the pump P.

In Newcomen's engine, which, as it is acted on by the pressure of the atmosphere, is often called an atmospherical engine, the cylinder was open at the top, and therefore, during the descent of the piston, the air exerted a great power in cooling it; but in the modern engines, where steam is the active power, both in raising and depressing the piston, the top of the cylinder is closed with an iron lid, and not an atom of steam can escape, except at the proper time, into the condenser. In order that the connecting rod *e*, may work freely, and yet possess this desirable property of being steam-tight, it passes through what is called a

*stuffing* or *packing box*. The stuffing consists of some material which the steam will rather adapt to its office than injure; leather, which is used for the stuffing or collars of machines never to be subjected to heat, will not answer here; hempen yarn is the material usually employed. The rod of the piston *l*, passes through a stuffing box of the same kind as that of the piston E; and the pistons themselves are surrounded with stuffing.

The cylinder D, is surrounded by a case, to keep it from being cooled by contact with the external air. The extremity, or any given point removed from the centre of the great beam, can describe only the arc of a circle; but it is necessary that the piston rod *e*, should rise and fall vertically. Newcomen effected this object, by fixing the end of the beam into the arc of a circle, the radius of which was equal to the distance from the centre of the beam; a chain went over this arc, and was fastened on the higher end of it; this simple contrivance effectually answered his purpose, because in his engine the effective stroke was only downward; but here, in a double power engine, where the stroke is both upwards and downwards, a chain would yield in rising, and be altogether unsuitable. An apparatus is therefore used, called the parallel joint, which is easily understood by inspection. By this means, the rod *e*, not only rises and falls perpendicularly, but is perfectly rigid, and communicates all its motion to the great beam in each direction of its motion. The connecting rod *g*, does not require the same contrivance, because it does not rise and fall perpendicularly; its lower end, with the outer end of the crank, describing a circle; it has therefore only a simple joint, admitting of this deviation.

CANALS. A canal is an artificial channel filled with water from rivers, &c., in order to make a navigable communication from one place to another. The operations necessary for making artificial navigations, depend on many circumstances; as the situation of the ground, its vicinity or connexion with rivers, the ease or difficulty with which a proper quantity of water can be procured, with a variety of other points, which must be taken into consideration, before such a work can be entered upon. When the ground is naturally level and unconnected with rivers, the execution is easy, and the navigation is not liable to be disturbed by floods; but when the ground rises and falls, and cannot be reduced to a level, artificial methods of raising and lowering vessels must be used, which vary according to circumstances.

It cannot be expected, in a work of the present kind, that we should find room to describe the various parts of a canal—its embankments—its culverts, aqueducts—tunnels, gates, and weirs, locks, &c. For an account of these, we must refer our readers to the treatises which particularly relate to them, and which are now common in the country. The remainder of this article will be devoted to a general account of some of the more considerable works of this sort, which are to be found in various parts of the globe.

*Canals of Egypt*. This country has long been celebrated for its canals—the principal of which are, however, the *canal of Alexandria*, extending from that city to Rosetta and the Nile; the *canal of Jessuf*, on

the western bank of the Nile, and parallel to it,—and that of the *Red Sea and Nile* across the isthmus of Suez.

*Canals of China.* The empire of China is supposed to have a more extensive inland navigation than any other nation; if not greater than all other nations. The course of the Chinese canals is generally in a northerly and southerly direction, between the two principal rivers of the country—the Yang-tse and Yellow river. The summits to be passed over by boats are often very great. This is effected, in that country, chiefly by means of inclined planes and rollers, over which they are drawn by men. Some of the most noted of these works have been in operation about 2000 years, having been completed nearly a century before the Christian Era; and about A. D. 605, it is stated there were completed in the empire 1600 leagues of canal. The most celebrated is the *Imperial* canal, by which a communication is opened between Pekin and Canton. Malte-Brun estimates the length of this to be 1660 miles; but it is stated by others to be considerably less. The navigation of the whole line occupies about three months. None but the Emperor's boats, estimated at 1000, of 100 tons burthen each, are permitted to pass upon it.

*Canals of Italy.* To the Italians we are indebted for the great improvements in respect to locks and sluices found in modern canals; but which were wanting in those of ancient times; and in those of China at the present day. These were the invention of two engineers of Viterbo, brothers, whose names have not been handed down. The canals of Italy are too numerous to be specified here.

*Canals of Russia.* Canals in Russia owe their existence to Peter the Great, who had observed their beneficial effects in Holland. He commenced three; of which we may notice—*the canal of Ladoga*, begun 1718, and finished by the Empress Anne, 67½ miles long, uniting the Volk and the Neva; the canal of *Vishnei-Volosholk*, forming a communication by water, with the assistance of the Wolga and several other rivers, between Astrachan and Petersburg, or between the Caspian and the Baltic. Through this latter canal, 3485 barques are said to have passed in a single year. By means of the canals and rivers of Russia, goods may be transported from the frontiers of China to Petersburg, a distance of 4472 miles; and the line of navigation from Astrachan to the capital is 1434 miles.

*Canals of Sweden.* Inland navigation has, for many years, been a subject of much interest to the government of Sweden. Several of the modern canals are quite long and well constructed. We may specify the *canal of Stromsholm*, 60 miles long, with 25 locks; the *Kindac canal*, and the *Gotha canal*, designed to open a communication between lake Wenner and the Baltic; and the *canal of Trolhatta*, making a navigable channel around the rapids of Trolhatta, in the river Gotha. This last canal, which is but two miles in length, is a stupendous work. It has nine locks, which rise and fall 114 feet, mostly hewn from a solid rock.

*Canals of Denmark.* The principal canal in Denmark is that of *Keil*, which unites the Baltic with the German ocean. It was begun in 1777, and completed in 1785. It is 100 feet broad at the top, and 57 at the bottom. The least depth of water is 10 feet.

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CANALS.

*Canals of Holland.* Canals intersect this country, as is well known, in every direction. They serve for navigation in summer, and roads of ice in winter. The most celebrated canal is the great ship canal of Amsterdam, extending from this city to Niewe Diep, on the north coast of Holland, a distance of 41 miles, by a circuitous route of 50½ miles. At the top the breadth is 124½ English feet; at the bottom 36—with a depth of 20 feet 9 inches. The canal is sufficiently wide to admit of one frigate passing another.

*Canals of Germany.* Canal navigation in Germany is quite limited, considering the extent and resources of the country. This is chiefly attributed to the division of the territory into numerous small and independent states. The two principal canals are those of Vienna, between that city and Newstadt, 40 miles long; and *Francis*, of the same length, between the Danube and the Jeysse.

*Canals of France.* There are probably not less than 50 canals in France, which furnish an inland navigation of about 900 miles. The first great canal constructed in France was the Canal of *Briare*, between the Loire and Seine. It is 34½ miles in length, and was 37 years in executing. The bottom of this canal is 25 feet wide; the number of locks 40 or 42. The estimated cost was $3,700,000. The *Languedoc* canal, which opens a communication between the Mediterranean and the Atlantic, is also a stupendous work, of 148 miles in length; 64 feet wide at the surface; 34 at the bottom, rising at the summit 640 feet, which are passed by means of 114 locks. The canal passes under a mountain at Beziers, by a tunnel 720 feet in length. It is crossed by 92 road bridges, and has 55 aqueduct bridges. Its cost was $6,160,000. Besides the above, we may mention as works of great importance, the *canal of Orleans*—of *Loing*—of the *Centre*—and of *St. Quitin.*

*Canals of Great Britain.* The English were a century after the French in commencing the construction of canals upon a large scale, the act for the first canal being passed by parliament in 1735; but since that time, numerous works of this kind have been completed, and every year is adding to the number. In 1823, the total length of canals in the United Kingdom, was 2589 miles. One of the principal canals in England is denominated the *Grand Trunk*, which passes through the centre of the country, and connects the Mersey with the Trent, 99 miles; thence to the Severn, 40 miles. A branch of this canal, called the *Oxford Canal*, extends 90 miles to that city. From the upper part of this latter canal, another branch, of 100 miles in length, extends to the Thames, a short distance above London, called the *Grand Junction.* In Scotland, the principal canal is the *Caledonian canal*, which connects the Murray Firth, on the eastern coast, with the Atlantic ocean on the west. It is 59 miles in length (36 of which are in natural waters) and is navigable for frigates of 32 guns. This canal cost $36,500 per mile. In Ireland, the chief canal is called the *Grand Canal.* It extends from the Liffey, at Dublin, 83 miles, to the river Shannon.

*American canals.* The first canal of any magnitude constructed in the United States, was the *Middlesex canal*, uniting the Merrimac with Boston harbor. This canal, which is 22 miles in length, was commenced in 1790. Since that date, and indeed within 14 or 15 years, a great extent of inland navigation, by means of canals, has been opened in

the country. At the present time, [1831] there is probably not far from 2500 miles of canal, either constructed, or in progress of execution among us. In the single state of Pennsylvania, the canals constructed, or in contemplation, have been estimated at a length of 900 miles—almost equal to that of France. Among the principal canals in the United States, we may briefly mention, besides the Middlesex, the Blackstone, connecting Worcester and Providence, 45 miles; the Farmington canal, connecting, when fully completed, New Haven and Northampton, 65 miles; The Hudson and Erie canal, connecting Albany and Lake Erie, 363; to which we may more briefly add, the Champlain canal, the Hudson and Delaware, Morris and Ohio state canal, besides several others.

No friend to his country can regard with indifference these numerous channels of internal communication, whether viewed as evidences of a spirit of enterprize, or considered as sources of wealth and convenience.

## HEATING AND VENTILATION.

FUEL. In a climate like that of the United States, especially that of the middle and northern portion, where fires are essential to comfort, for a considerable part of the year, the subject of fuel is not without its importance to all. Wood is probably annually diminishing in the more populous parts of the country, and is gradually increasing in price unless it be in those places, the inhabitants of which can avail themselves of coal. But even coal must have its limits; and after the lapse of an indefinite period, will itself be enhanced in price. Considered prospectively, every patriot and every benevolent man must perceive the importance of economy in respect to fuel—for even if now there be an abundance, prodigality such as has been practised, would with the increased demand, arising from an increased population, and the multiplication of machinery in the country, at no distant day, so diminish the quantity of fuel in the country, as to bring distress upon most classes, especially upon the poor. Indeed, as a writer whom we shall have occasion to notice more particularly presently, remarks, " the savings of a large portion of the poor, during the summer, are now often inadequate to purchase a sufficient supply of fuel for the winter." "Hence," he remarks, "it must obviously be highly important to ascertain the comparative efficiency of different kinds of fuel; as without this knowledge, those who are desirous of economizing, may be prodigal through ignorance."

To the writer above alluded, (Mr. Marcus Bull of Philadelphia,) we are indebted for a course of experiments upon the combustion of fuel, founded upon the quantity of heat or temperature imparted to the air of a small chamber, and maintained for a certain time. In his experiments, a pound of fuel was burned in a small stove, provided with a crooked funnel or pipe, of sufficient length to give out all the heat, before the draught passed it off out of the apartment, leaving the last end of the pipe always cold. Of the memoir published by Mr. Bull, it gives us pleasure to record the opinion of Professor Silliman: " It is replete with interesting information, and is to be regarded as one of the most important contributions of science to the arts, and to domestic economy, which has been made for a long time in this country."

"The chamber which Mr. Bull prepared for the purpose of his experiments," observes Mr. Allen in his Mechanics, to which work we

are indebted for the following epitome of Mr. Bull's course of experiments, "was eight feet square, containing 512 cubic feet of air. It was constructed within a larger room, of boards grooved together in the most perfect manner for rendering it tight, and cutting off the communication with the air of the external room. The fuel upon which he made his experiments, was consumed in a small cylindrical stove, twelve inches high, and four inches in diameter, made of common sheet iron, lined with clay. The pipe of the stove made of extra thin *black* tin, for radiating as well as communicating heat in the most favorable manner, was two inches diameter, and forty-two feet long, with several elbows. The standard taken by him was shell bark hickory, which is heavier than any other wood in his table, and disengages, during its combustion, an equal quantity of heat from any given weight. The comparative numbers express the value of one cord of each of the woods, one ton of the anthracite coals, and one hundred bushels of the bituminous coals, charcoal and coke. The column of comparative values he found in this manner; "The value of a given quantity of fuel is directly proportioned to the *time* that a given weight of it maintained the air of the room at a given temperature, and also its weight."

"The comparative value for producing heat, of the different sorts of fuel in the table, may be found, by assuming a price for the hickory, as sold in the market, for one cord of 128 cubic feet. Supposing the cord of shell bark hickory to be six dollars, it is required to ascertain by the table, the equivalent price for a cord of red heart hickory. The comparative value of the former is 100, and of the latter, 81. Then as 100 : 600 :: 81 : 486=four dollars eighty-six cents; at which price the red heart hickory would be as cheap as the shell bark hickory.

"A mere examination of the comparative numbers will show that a cord of white birch is 52 per cent. less in value, than a cord of shell bark hickory, and the difference per cent. may be calculated from the compartive numbers between any two articles sold at the same price.

"In like manner, the comparative value of a ton of Lehigh coal may be found by the rules of proportion. As 100, the standard of a cord of hickory, is to $6 00, the price of it in the market, so is 99, the comparative value of this coal for emitting heat, to the answer, $5 94, which shows them to be nearly of the same value, supposing each article to be consumed under nearly the same circumstances.

"The comparison of a ton of Lehigh coal, at seven dollars, with one hundred bushels of Newcastle coal, at thirty-five dollars, the price of each description of coal at that time in the Philadelphia market will give the following result, greatly in favor of the American article. As 99 : $7 00 :: 198 : $14 00—that is, one hundred bushels of Newcastle coal, costing thirty-five dollars, will impart twice as much heat to a room, when burned in a close stove, as one ton of Lehigh coal, by which a ton of Lehigh coal, at seven dollars, appears to be of equal value for this purpose, to 50 bushels of Newcastle coal, costing seventeen dollars and fifty cents. The American coal is therefore actually cheaper, when used for heating rooms by close stoves, than the English coal, by 150 per cent."

Indeed the value of anthracite coal, for heating rooms by means of close stoves, has been found by experience, so evidently superior in point of economy, to that of other sorts of fuel, that it has already come into very general use.

| Common names of Woods and Coals. | Specific Gravities of Dry Wood. | Avoirdupoise lbs. of dry wood in one cord. | Product of Charcoal from 100 parts of dry wood by weight. | Bushels of charcoal from 1 cord of dry wood. | Time 10° of heat were maintained by the combustion of 1 lb. of each article. | | Value of specified quantities of each article compared with shell-bark Hickory. |
|---|---|---|---|---|---|---|---|
| | | | | | H. | M. | Cord. |
| White Ash, | .772 | 3450 | 25.74 | 31 | 6 | 40 | 77 |
| Apple Tree, | .697 | 3115 | 25. | 33 | 6 | 40 | 70 |
| White Beach, | .724 | 3236 | 19.62 | 23 | 6 | | 65 |
| Black Birch, | .697 | 3115 | 19.40 | 27 | 6 | | 63 |
| White Birch, | .530 | 2369 | 19. | 24 | 6 | | 48 |
| Butter-Nut, | .567 | 2534 | 20.79 | 50 | 6 | | 51 |
| Red Cedar, | .565 | 2525 | 24.72 | 30 | 6 | 40 | 56 |
| American Chestnut, | .522 | 2333 | 25.29 | 27 | 6 | 40 | 52 |
| Wild Cherry, | .597 | 2668 | 21.70 | 26 | 6 | 10 | 55 |
| Dog Wood, | .815 | 3643 | 21. | 34 | 6 | 10 | 75 |
| White Elm, | .580 | 2592 | 24.85 | 36 | 6 | 40 | 58 |
| Shell-Bark Hickory, | 1.000 | 4469 | 26.22 | 32 | 6 | 40 | 100 |
| Pig-Nut Hickory, | .949 | 4241 | 25.22 | 32 | 6 | 40 | 95 |
| Red-Heart Hickory, | .829 | 3705 | 22.90 | 39 | 6 | 30 | 81 |
| Witch-Hazel, | .784 | 3505 | 21.40 | 25 | 6 | 10 | 72 |
| American Hornbeam, | .720 | 3218 | 19. | 30 | 6 | | 65 |
| Hard Maple, | .644 | 2878 | 21.43 | 27 | 6 | 10 | 60 |
| Soft Maple, | .597 | 2668 | 20.64 | 28 | 6 | | 54 |
| Chestnut White Oak, | .885 | 3955 | 22.76 | 36 | 6 | 30 | 86 |
| White Oak, | .855 | 3821 | 21.62 | 39 | 6 | 20 | 81 |
| Shell-Bark White Oak, | .775 | 3464 | 22.50 | 32 | 6 | 20 | 74 |
| Barren Scrub Oak, | .747 | 3339 | 21.27 | 38 | 6 | 30 | 73 |
| Pin Oak, | .747 | 3339 | 22.22 | 32 | 6 | 20 | 71 |
| Scrub Black Oak, | .728 | 3254 | 23.80 | 38 | 6 | 30 | 71 |
| Red Oak, | .728 | 3254 | 22.43 | 30 | 6 | 20 | 69 |
| Barren Oak, | .694 | 3102 | 22.37 | 29 | 6 | 20 | 66 |
| Rock Chestnut Oak, | .678 | 3030 | 20.86 | 28 | 6 | | 61 |
| Yellow Oak, | .653 | 2919 | 21.60 | 41 | 6 | 10 | 60 |
| Yellow Pine, (Soft,) | .551 | 2463 | 23.75 | 33 | 6 | 30 | 54 |
| Pitch Pine, | .426 | 1904 | 26.76 | 30 | 6 | 40 | 43 |
| White Pine, | .418 | 1868 | 24.35 | 27 | 6 | 40 | 42 |
| Yellow Poplar, | .563 | 2516 | 21.81 | 34 | 6 | 10 | 52 |
| Lombardy Poplar, | .397 | 1774 | 25. | 33 | 6 | 40 | 40 |
| Sassafras, | .618 | 2762 | 22.58 | 28 | 6 | 20 | 59 |
| Sycamore, | .535 | 2391 | 23.60 | 29 | 6 | 30 | 52 |
| Black Walnut, | .681 | 3044 | 22.56 | 31 | 6 | 20 | 65 |
| | Specific Gravities of dry coal | Lbs. of dry coal in one bushel. | | | | | Ton. |
| Lehigh Coal, | 1.494 | 78.61 | | | 13 | 10 | 99 |
| Lacawaxen Coal, | 1.400 | 73.67 | | | 13 | 10 | 99 |
| Rhode-Island Coal, | 1.438 | 75.67 | | | 9 | 30 | 71 |
| Schuylkill Coal, | 1.453 | 76.46 | | | 13 | 40 | 103 |
| Susquehanna Coal, | 1.373 | 72.25 | | | 13 | 10 | 99 |
| Swatara Coal, | 1.459 | 76.77 | | | 11 | 20 | 85 |
| Worcester Coal, | 2.104 | 110.71 | | | 7 | 50 | 59 |
| | | | | | | | 100 bushels. |
| Cannel Coal, | 1.240 | 65.25 | | | 10 | 30 | 230 |
| Liverpool Coal, | 1.331 | 70.04 | | | 9 | 10 | 215 |
| Newcastle Coal, | 1.204 | 63.35 | | | 9 | 20 | 198 |
| Scotch Coal, | 1.140 | 59.99 | | | 9 | 30 | 191 |
| Karthaus Coal, | 1.263 | 66.46 | | | 9 | 20 | 208 |
| Richmond Coal, | 1.246 | 65.56 | | | 9 | 20 | 205 |
| Stony Creek Coal, | 1.396 | 73.46 | | | 9 | 50 | 243 |
| Hickory Charcoal, | .625 | 32.89 | | | 15 | | 136 |
| Maple Charcoal, | .431 | 22.68 | | | 15 | | 114 |
| Oak Charcoal, | .401 | 21.10 | | | 15 | | 106 |
| Pine Charcoal, | .285 | 15. | | | 15 | | 75 |
| Coke, | .557 | 29.31 | | | 12 | 50 | 126 |
| Composition of two parts Lehigh Coal, one Charcoal, and one Clay, by weight, | | | | | 13 | 30 | |

In the preceding table, the weight of the mineral coal is given in its dry state. In ordinary calculations the weight of coal is estimated in the damp state as commonly used from the mines. The anthracite, from its peculiarly close glassy texture, imbibes but little moisture. The weight of a bushel of bituminous coals will generally average nearly one-seventh more when damp than when dry, as stated in Mr. Bull's table.

A bushel of Richmond coal under ordinary circumstances is supposed to weigh - - - - - 76 lbs.
Do. New-Castle Coal - - - - about 80 do.
Do. Anthracite Coal - - - - - 81 do.

Mr. Bull also extended his enquiries into the comparative advantages of close stoves and open fire places for heating the air of his little chamber. He considered that when the same stove and pipe was used, as in his preceding experiments, that the whole heat given out by the burning fuel was imparted to the air of the room, and that there was consequently no loss of heat by the flue or otherwise. Assuming then this stove and long funnel as the standard, he has given the following results:

*Each apparatus required, to maintain the room at the same temperature, and for the same time.*

| | Weight of Fuel. lbs. |
|---|---|
| SHEET IRON CYLINDER STOVE, as before described, with 42 feet of 2 inch pipe, as used in the course of experiments on fuel | 1. |
| No. 1. OPEN CHIMNEY FIRE PLACE, of ordinary construction for burning wood | 10. |
| 2. OPEN PARLOR GRATE, of ordinary construction, for burning Anthracite coal | 5.55 |
| 3. OPEN FRANKLIN STOVE, with one elbow joint, and 5 feet of pipe, diameter 6 inches | 2.70 |
| 4. CAST IRON TEN PLATE STOVE, with one elbow joint and 5 feet of pipe | 2.22 |
| 5. SHEET IRON CYLINDER STOVE, inside coated with clay, with one elbow joint, and five feet of pipe, diameter 2 inches | 1.49 |
| 6. SHEET IRON CYLINDER STOVE, with 3 elbows and 13½ feet of pipe, diameter 2 inches | 1.28 |
| 7. SHEET IRON CYLINDER STOVE, with 3 elbows and 13½ feet of pipe, all horizontal | 1.22 |
| 8. SHEET IRON CYLINDER STOVE, with 9 elbows and 13½ feet of pipe | 1.05 |

The preceding table shows that it costs ten times as much to heat rooms by means of ordinary open fire places, as by close stoves with long pipes or funnels; and that an open parlor grate comparatively requires five times the expense for fuel, and an open Franklin stove nearly three times the expense, to impart an equal degree of heat to the air of an apartment.

Some sorts of green wood were found by Mr. Bull to contain 42 per cent. of moisture. In burning 100 lbs. of green wood, it is therefore necessary to convert into steam 42 lbs. of water, which must absorb a very considerable proportion of all the heat produced.

But few persons are aware of the great loss attending the use of green wood for fuel: otherwise more attention would certainly be bestowed in procuring perfectly seasoned wood, not only for boilers and furnaces, but also for purposes of domestic economy. Taking Mr. Bull's statement of the quantity of water contained in green wood at 42 per cent. the following calculation will demonstrate how little heat will be actually given out during combustion. It has been before stated that one pound of Newcastle coal is required to convert 6 lbs. of water into steam, and that 2½ lbs. of wood will impart as much heat as one pound of coals. To convert 42 pounds of water into steam will therefore require all the heat produced by the combustion of 17½ pounds of wood. Deducting 42 pounds of water from the gross weight of 100 pounds of green wood, leaves but

58 lbs. of dry wood.
17½ lbs. of do. required to evaporate 42 lbs. of water.

40½ lbs. of wood only remains from which heat is obtainable.

Sixty per cent. of the weight of green wood is therefore entirely lost, and it is accordingly found, that unless such wood be kept constantly piled upon the hearth, there will not be sufficient heat produced to maintain combustion, and the fire will expire among the blackened brands.

The principal objection urged against the use of close stoves is the confined dry air produced by them. It is well known, that air, which passes over iron or bricks heated red hot, acquires a disagreeable odor, and produces a harsh sensation upon the lungs, accompanied by a tendency to cough. The clay or fire bricks, with which anthracite coal stoves are lined, being slow conductors of heat, are peculiarly well adapted for keeping the external parts of the stove at a temperature which will not have the disagreeable effect upon the air above mentioned. Whenever the heat of a stove does not exceed 300°, the air is not rendered unpleasant for respiration. On this account, steam pipes produce a temperature at once mild and agreeable.

The objection to the confined and unpleasant air usually proceeding from close stoves in small apartments, may be in a great manner obviated by introducing the hot air from a stove or furnace placed in the basement of the building. The stove, in this case, is inclosed by brick work, with an interstice around it for the free circulation of the air, which is admitted to come in contact with the heated sides of it. After becoming heated, the air ascends, and is conveyed by means of flues or pipes to the several apartments, into which it is commonly discharged through an aperture in the wall near the floor. A shutter of soap stone, sliding in a groove, serves to exclude the hot air when not required. Much inconvenience and danger sometimes attend the attempts to adapt this apparatus to warming houses not originally calculated for it. The same object may be more economically attained by placing the stove in the principal entry or hall of a dwelling house. The warm air will diffuse itself through every apartment, which communicates with the hall or entry, with surprising regularity. The circulation of the currents of warm air into each room may be shown by holding the blaze of a candle near the top of the doorway, and placing another directly under it upon the floor. The uppermost flame will

be drawn into the apartment by the current of warm air entering, while the cold air rushing out will cause the flame of the lower candle to incline in an opposite direction. Several rooms and chambers may thus be rendered comfortably warm by one fire. The stove pipe may be safely conducted through the floors or partitions to the nearest chimney, by inserting in them blocks of free stone with circular apertures adapted to the size of the pipe. Should the plan of the dwelling house admit of placing the stove in the basement or cellar immediately below the entry, the inconveniences arising from the light dust and ashes, usually attendant upon the burning of anthracite coal, may be also avoided. The stove, in this case, is inclosed in a sort of brick closet, as before described, with proper apertures for the admission of the cold air, and for supplying the necessary fuel. The aperture in the free stone, let into the floor, must be made not only sufficiently large to admit the pipe, but also to allow about two inches space around it, for the ascent of the warm air.

Chimneys. A common opinion concerning the ascent of smoke is, that it is drawn up; but the truth is, the smoke is pressed up by the cold air, which is coming to the fire place from the room. The warm air rises upon the principle of specific gravity, and carries the smoke with it, although at certain times the smoke may be heavier than the air itself. The great art, then, in making a chimney carry smoke well, is to produce this current of air in sufficient force to take off the smoke. To effect this, it is obvious that the funnel should be made as smooth as possible, and should be plastered, and kept free from soot. Various causes have been assigned by Dr. Franklin, Count Rumford, and others, which prevent chimneys from conducting smoke well, and the remedies have been pointed out by the same gentlemen. We shall avail ourselves of their suggestions in the following article, as collected and abridged by the editor of the New-England Farmer.*

Chimneys in new buildings frequently smoke for want of air to supply the current, which should constantly ascend the flue. This is the case when the room is tight, and no passage is left open for the air to enter, except the key hole, and even that, perhaps, closed by a little dropping shutter. No air can then be had to supply what is called the draught of the chimney. The fire will burn but dimly, and the smoke will be diffused through the apartment. Those, therefore, who stop every crevice in a room to prevent the admission of fresh air, and yet would have their chimney carry smoke require inconsistencies, and expect impossibilities. The remedy, in this case, is to admit more air, with as little inconvenience as possible.

Another cause why chimneys smoke, is the improper dimensions of the throat, or space immediately over the fire. The space should be so contracted, that the whole current of air may be well heated; in which case, the smoke can hardly fail to ascend. But in order to effect this, it may be sometimes necessary to lower the mantel so that the opening in the chimney may be brought nearer the fire. A piece of sheet iron or tin, fastened on, and extending somewhat lower than the mantel, will commonly answer this purpose. By lowering the mantel, however, we lose the heat in proportion to the increase of the

* New England Farmer, Vol. iv. No. 17.

draught; and it is an expedient which should not be adopted, if any other remedy can be conveniently applied.

Chimneys often smoke in consequence of the shortness of their funnels. The difference of the weight of the heated air within, and the cooler air without the funnel, is the cause of the ascent of smoke. If the funnel be short, the difference will be small, and the draught will of course be slight.

This defect is often found in low buildings, or the upper story of high ones, and it is not easily avoided; for if the flue be raised high above the roof to strengthen its draught, it is in danger of being blown down, and crushing the roof beneath it. The remedy in this case, is to contract the opening of the chimney, (which may be done by lowering the mantel) so as to oblige the entering air to pass through, or very near the fire, by which means it will be considerably heated, and by its great rarefaction cause a powerful draught, and compensate for the shortness of its column. The case of too short a funnel is more general than would be imagined, and often found where one would not expect it; for it is not uncommon in ill contrived buildings, instead of having a separate funnel for each fire place, to bend and turn the funnel of an upper room so as to make it enter the side of another flue that comes from below. By this means the funnel of the upper room is made short, of course, since its length can only be reckoned from the place where it enters the lower funnel, and that flue is also shortened by all the distance between the entrance of the second funnel and the top of the stack; for all that part being readily supplied with air through the second flue, adds no strength to the draught, especially as that air is cold, when there is no fire in the second chimney. The only easy remedy here, is to keep the opening shut of that flue in which there is no fire.

Another very common cause of the smoking of chimneys, is their overpowering one another. For instance, if there be two chimneys in one large room, and you make fires in both of them, you will find that the greater and stronger fire will overpower the weaker, and draw air down its funnel to supply its own demand, which air, descending in the weaker funnel, will drive down its smoke, and force it into the room. If, instead of being in one room, the two chimneys are in two different rooms, communicating by a door, the case is the same whenever the door is open. The remedy is, to take care that every room have the means of supplying itself from without, with the air its chimney may require, so that no one of them may be obliged to borrow from another, nor under the necessity of lending.

Another cause of smoking is, when the tops of chimneys are commanded by higher buildings or by a hill, so that the wind blowing over such eminences, falls like water over a dam, sometimes almost perpendicularly on the tops of chimneys that lie in its way, and beats down the smoke contained in them. The remedy commonly applied in this case, is a turn-cap, made of tin or plate-iron, covering the chimney above and on three sides, open on one side, turning on a spindle, and which being guided or governed by a vane, always presents its back to the wind. This method will generally be found effectual, but if not, raising the flues where practicable, so as their tops may be on a level

with, or higher than the commanding eminence, is more to be depended on.

There is another case, in which the eminence is to the leeward of the chimney. Suppose the chimney to be so situated that its top is below the level of the ridge of the roof, which, when the wind blows against it, forms a kind of dam against its progress. In this case, the wind being obstructed by this dam, will, like water, press and search for passages through it, and finding the top of the chimneys below the top of the dam or ridge, it will force itself down that funnel, and if there be a fire in such chimney, its smoke is of course beat down and fills the room. The only remedy for this inconvenience is to raise the funnel higher than the roof, supporting it, if necessary, by iron bars; for a turn-cap in this case, has no effect, the impeded air passing down through it in whatever position the wind may have placed its opening.

Chimneys otherwise drawing well, sometimes smoke in consequence of the improper situation of a door. When the door and chimney are placed on the same side of the room, if the door is made to open from the chimney, and only partly opened, a current of air is admitted and directed across the opening of the chimney, which is apt to draw out some of the smoke.

Chimneys that generally draw well, do nevertheless sometimes give smoke into the room, it being driven down by strong wind passing over the tops of their flues, though not descending from any commanding eminence. To understand this, it may be considered that the rising light air, to obtain a free issue from the funnel, must push out of its way, or oblige the air that is over it to rise. In the time of calm, or of little wind, this is done visibly; for we see the smoke that is brought up by that air, rise in a column above the chimney. But when a violent current of wind passes over the top of a chimney, its particles have received so much force, which keeps them in a horizontal direction, and follow each other so rapidly, that the rising light air has not strength sufficient to oblige them to quit that direction, and move upwards to permit its issue. Add to this, that some of the air may impinge on that part of the inside of the funnel which is opposed to its progress, and be thence reflected downwards from side to side, driving the smoke before it into the room. The simplest and best remedy in this case is the application of a chimney-pot, which is a hollow, truncated cone of earthen ware, placed upon the top of the flue. The intention of this contrivance is, that the wind and eddies which strike against the oblique surface of these covers, may be reflected upwards instead of blowing down the chimney. The remarkable chimneys observed at Venice, in which the top of the flue is larged and rounded in the shape of a funnel, seem also intended as a remedy to this inconvenience, that the wind blowing over one of the edges into the funnel may be slanted out again on the other side by its form.

Other causes which occasion chimneys to smoke, might be added; but for an account of these, we would refer our readers to Rees' Cyclopedia, article "*Chimney*," and also to the philosophical papers of Dr. Franklin and Count Rumford.

COMMUNICATION.

Telegraph, literally means that which writes, or is used for writing, at a distance; and is the term applied to an apparatus used for some time past, by several European governments, to convey information to distant places almost instantaneously. Although this invention was only brought into use during the late French Revolution, some sort of telegraphic intelligence was, it is said, known to the Greeks. The Marquis of Worcester, in 1662, mentions a kind of telegraph in his "Century of Inventions," but it was reserved for our own times to render such a mode of communication at once speedy and correct. The modern Telegraph, first used by the French in 1794, by M. Chappe, was thus exercised; at the first station, which was on the roof of the Louvre, he received in writing, from the committee of public safety, the words to be sent to Lisle, near which the French army at that time was. An upright post was erected at the Louvre, at the top of this were two transverse arms, moveable in all directions with much rapidity. The different positions of these arms stood as signs for the letters of the alphabet. Having received the sentence to be conveyed, he gave a signal to the second station to prepare. At each station was a watch tower on which telescopes were fixed, and the person on the watch gave the signal of preparation which he had received, which was communicated successively through all the line. The person at the second station then received letter by letter the sentence from the Louvre, which he repeated by his own machine, and thus throughout the whole line of stations, it was repeated with almost inconceivable rapidity to the final station at Lisle.

The most common telegraph in England, was, till lately, composed of six moveable boards, about three feet square each, turned by means of ropes, so as to exhibit twenty-four different characters, and nine figures; such a telegraph was for many years at the Admiralty, at Whitehall; but for some time past, another telegraphic method has been adopted there; it consists of a tall pole, or hollow cylinder with projecting arms that can be moved and withdrawn at pleasure.

The principal line of telegraphs in the United States, it is believed, is in the city of New York, from the Exchange in Wall street, to Sandy Hook. "It consists of a pole," says the author of the picture of New York, "rising from the cupola, with two arms, with which twelve different positions can be assumed; the first ten to represent the nine digits and the cypher, the eleventh as a separator of words and sentences, and the twelfth to excite attention.

The marine or ship signals are thirteen in number; the first also standing for the digits and cypher, and the other three denominated first, second, and third repeaters. The object of the repeaters is to obviate the necessity of duplicates and triplicates of the same signal.

A dictionary of the signals is printed. It is divided into five parts, the first embracing all the questions and replies requisite between vessels and telegraphic stations, together with the alphabet and points of the compass, and occupying the numbers from 1 to 1000: the second part containing sea phrases; the third part consists of a vocabulary of all the words in the language essential to be used. The fourth is a list

of vessels' names; and the fifth a list of countries, ports, cities, and harbors.

Much utility has been already derived from the marine signals, by enabling ships to communicate with each other at sea; and on approaching the shore, with the land telegraphs.

DEAF AND DUMB ALPHABET. The present is emphatically denominated the age of benevolence and improvement; and perhaps in nothing are these features more strikingly manifested, than in the institutions which are founding in the various civilized and enlightened countries of the globe, and which are designed to contribute to the welfare, and exalt the condition of mankind—especially the unfortunate portion of it. To this class certainly belong the dumb and deaf, and a more numerous class they are, than perhaps any of our readers are aware, who may not have turned their attention to the subject. In some of the countries of Europe, it is estimated that there is one deaf mute to 1500 or 1700 inhabitants. In the United States the proportion is thought to be one to every 2000; or 1000 for every 2,000,000 inhabitants.

To pour the light into these darkened minds—to form them for usefulness in society—and especially to guide them in the way of "life eternal," must be worthy of the philanthropist and the Christian. This attempt has been made, and with great success. There are not less than 81 establishments for deaf mutes in Europe—62 of which have been established within the last thirty years. Most of these are conducted according to the system of De l'Epee and Sicard, who may be considered as the founders of the modern art.

Within a few years, the system of these men has been introduced into the United States, by the Rev. Thomas H. Gallaudet, aided by Mr. Laurent Clerc, a distinguished pupil of Sicard. Important improvements, it is understood, have been made by Mr. Gallaudet, and such results produced as "have excited surprise in Europe, and have even been declared to be utterly improbable from their superiority to those usually produced." Several institutions growing out of that originally established under the auspices of Mr. Gallaudet, and others at Hartford, have been projected, and are now in operation in other parts of the United States—all of which have adopted the system of the parent institution. The mode of spelling words is by means of the hand, and figures, according to the cuts subjoined:

## DEAF AND DUMD ALPHABET.

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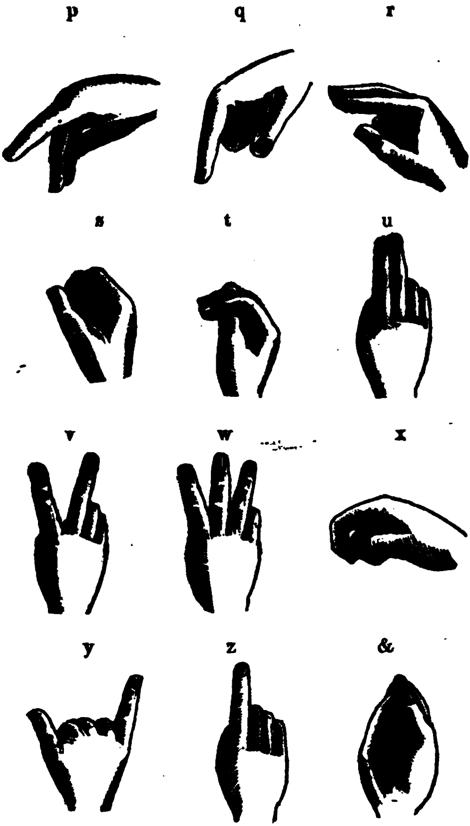
## DEAF AND DUMB ALPHABET.



# PART VIII.

## OF GOVERNMENT.

SOCIETY. Men either tacitly or by consent, have in all ages, associated together for their pleasure, or their convenience; hence it has been laconically but aptly stated, that the origin of society is *our wants.* Whether in the earlier ages of the world, formal contracts were entered into in regard to mutual association, cannot now be known; but there can be no doubt that a conviction of the weakness of individual effort to promote human hapiness first led to the union of the efforts of numbers, for its more complete accomplishment. The first and most probable association was that of persons of the same family; as families multiplied, their relationship of consanguinity decreased in intensity, and social relations, independently of blood, necessarily and naturally grew up. This appears to be in perfect accordance with the revealed accounts of the primitive origin of mankind, where single families formed the first society among themselves, which every day extended its limits; and when it grew too large to subsist with convenience in that pastoral state, in which the patriarchs appear to have lived, it necessarily subdivided itself by various migrations. Afterwards, as agriculture increased, migrations became less frequent; and various tribes, which had formerly separated, re-united; sometimes by compulsion and conquest, sometimes by accident, and sometimes perhaps by compact. But though society had not its forms beginning from any convention of individuals actuated by their wants, yet it is a sense of their weakness and imperfection that keeps mankind together; that demonstrates the necessity of this union; and that, therefore, is the solid and natural foundations, as well as the cement of society. This is what is meant by the original contract of society; which, though perhaps in no instance ever formally expressed at the first institution of a state, yet in nature and reason it must always be understood and implied in the very act of associating together, that *the whole should protect all its parts*, and that *every part should pay obedience to the will of the whole;* or, in other words, that the community should guard the rights of each individual member, and that in return for this protection, each individual should submit to the laws of the community.

GOVERNMENT. As *society* arises from our wants, so arises *government* from our errors, vices, and crime. Were man a perfect being, he would not need government. Individual security and happiness being the true end and design of government, whatever form insures it with the least expense, consistent also with the general security and happiness, is to be preferred. Government being therefore necessary for the preservation of social order, it is obvious that the exercise of it should be committed to persons in whom those qualities are most likely to be found, the perfection of which is among the attributes of Him who is emphatically styled the Supreme Being; namely, *wisdom*, *goodness* and *power;*

wisdom, to discern the real interest of the community; goodness, to endeavor always to pursue that real interest; and strength, or power, to carry this knowledge and intention into action. These are the natural foundations of sovereignty; and these are the requsites that ought to be found in every well constituted government.

DIFFERENT FORMS OF GOVERNMENT. The political writers of antiquity will not allow above three regular forms of government; the first, where the sovereign power is lodged in an aggregate assembly consisting of all the members of a community, is called *democracy;* the second where it is lodged in a council composed of select members, when it is styled *aristocracy;* the last, where it is intrusted to the hands of a single person, and then it takes the name of *monarchy.* All other species of government, they say, are either corruptions of, or reducible to these three. By *sovereign* power is meant that which makes and executes, or directs the execution of the laws. Wherever this power resides, all others must conform to, and be directed by it. For it is always at the option of such power to alter the form and administration by new laws, and to put the execution of the laws generally into whatever hands it pleases; and all the other powers of the state must, of course, obey it in the execution of their several functions, or else the constitution is at an end.

In a *Democracy,* where the right of making laws resides in the people at large, public virtue, or goodness of intention, is *more likely* to be found than in either of the other forms of government. Popular assemblies are, however, frequently weak in their plans, and slow in their execution; though they generally *mean* to do the thing that is right and just, and have always a certain degree of patriotism or public spirit.

In *Aristocracies* there is more coolness and deliberation than in perhaps, any other form of government; and from their being composed usually of the richest members of the state, they have opportunities for the acquisition of knowledge, which are denied to the ordinary citizen; yet, from the absence of motive to excite their intellects, it does not ordinarily follow that the aristocracy constitutes the wisest portion of a state; the persons composing the aristocracy are, besides, generally removed by their situation, from that sympathy necessary to enable them to consult without prejudice, the interests of the main body of the people; and hence of all forms of government, aristocracy appears to be the worst.

An *absolute monarchy* is the most powerful of any; and provided it were possible to have a perfect man as a monarch, we could not hesitate as to the choice between these three kinds of government. As, however, an absolute monarch is very likely to employ his power to the great injury of a state, such a government cannot be approved.

STATE GOVERNMENTS. The several state governments included within the United States are *repesentative republics,* inasmuch as the *people* are governed by those whom they choose to represent them.

And all these governments have written constitutions, excepting the state of Rhode Island, where the government is still administered according to the provisions of its ancient colonial charter. It is proposed to exhibit the prominent features of the respective constitutions of the States, with the more obvious peculiarities of each.

MAINE. The constitution of this state was formed in 1819; but did not go into operation until 1820.

*Legislature.* This consists of a Senate and House of Representatives, the members of which are chosen annually, on the second Monday in September. Meeting at *Portland*, on the first Wednesday in January. The number of Senators cannot be less than twenty, nor more than thirty-one. Number of Representatives, not less than one hundred, nor more than two hundred. The qualifications for Representatives are, citizenship for five years, and residence in the State one year. Senators must possess like qualifications, and be twenty-five years of age.

*Executive.* The executive power is vested in a Governor, chosen annually by the people, on the second Monday in September. He must have the same qualifications as Senators, and be thirty years of age. A council of seven, chosen annually by joint ballot of the Senate and Representatives. The executive has the power of appointment and pardon, and a qualified negative on acts of the Legislature, as in Massachusetts.

*Judiciary.* The judicial power resides in a Supreme Judicial Court and County Courts. Judges appointed by the governor and council—hold their office during good behavior; but are disqualified at the age of seventy.

*Right of Suffrage.* The right of suffrage is nearly universal; being granted to all male citizens of twenty-one years of age and upwards, who have resided in the state for three months next preceding the election. Paupers, persons under guardianship, and Indians not taxed, are excepted.

NEW HAMPSHIRE. Constitution established in 1784; altered and amended in 1792.

*Legislature.* Consists of two branches—House of Representatives and Senate, styled *the General Court of New Hampshire.* Representatives are chosen by towns, at the rate of one representative to one hundred and fifty polls; three hundred additional polls entitle to another representative. Representatives must have been inhabitants two years; have an estate of one hundred pounds, half of which must be freehold. The Senate consists of twelve. Persons to be eligible to the Senate, must have a freehold of two hundred pounds; be thirty years of age, and have resided in the state seven years. They are chosen by districts.

*Executive.* The Executive consists of a Governor, who must have resided in the State seven years, and have an estate of five hundred pounds, one half freehold; and a council of five elected by the people. Powers and duties as in Maine. Annual election, at which the Governor, Council, Senators, and Representatives are chosen, second Tuesday

in March. Meetings of the General Court at Concord, first Wednesday in June.

*Judiciary.* As in Maine.

*Right of Suffrage.* Granted to all males of twenty-one years of age and upwards, excepting paupers, and persons excused from paying taxes at their special request.

VERMONT. The first constitution of Vermont was framed in 1777; the present constitution was adopted in 1793.

*Legislature.* The Legislative power is vested in a House of Representatives, styled *the General Assembly of Vermont.* Each town sends one representative. Election annual, on the first Tuesday in September. Seat of government at *Montpelier.* Meeting, second Tuesday of October. The qualifications for representatives are two years residence in the State.

*Executive.* Governor, Lieutenant Governor, and a Council of twelve persons, all chosen annually by the people. The executive commission all officers, try impeachments, revise and propose amendments to the laws, and can suspend a proposed law until the next General Assembly.

*Judiciary.* A Supreme Court consisting of three Judges, and a County Court, of three Judges for each county. Judges, sheriffs, and justices of the peace, may be elected annually by the General Assembly.

*Council of Censors.* Once in seven years, a Council of Censors is chosen, consisting of thirteen persons, whose duty it is to examine the various departments of the government, and to inquire whether they have faithfully discharged their duty, according to the constitution, &c.

*Right of Suffrage.* This extends to all males of twenty-one years of age and upwards, who have resided one year in the State next preceding the election, and are of a " quiet and peaceable behavior."

MASSACHUSETTS. The constitution of this State was formed in 1780, and altered and amended in 1821.

*Legislature.* This consists of a Senate and House of Representatives, styled *the General Court of Massachusetts.* Qualifications of representatives, residence one year in the town in which they are chosen, and a freehold of one hundred pounds, or a taxable estate of two hundred pounds. Senators must have resided five years in the district in which they are chosen—have a freehold of three hundred pounds, or a taxable estate of six hundred pounds. The Senate consists of forty members, chosen annually. One hundred and fifty ratable polls entitle a town to one representative, and two hundred and twenty-five additional ratable polls to another.

*Executive.* A Governor, elected annually by the people, on the first Monday of April, and a Council of nine members, chosen from the Senators, by the joint ballot of the General Court. If any, or all the Council, thus chosen, decline the appointment, the deficiency is supplied from the people at large. A Lieutenant Governor is elected at the same time with the Governor. Both these must have been seven years resident in the State, and have a freehold of one thousand pounds.

*Judiciary.* A Supreme Court, Court of Common Pleas, &c. The Judges are appointed by the Governor, by and with the advice and consent of his council. They hold their offices during good behavior.

*Right of Suffrage.* Every male citizen twenty-one years of age and upwards, paupers and persons under guardianship excepted, has the right of suffrage, provided he has resided within the Commonwealth one year, and within the town or district in which he may claim a right to vote, six calendar months, next preceding any election, and who has paid a state or county tax assessed upon him within two years, next preceding such election, and also every citizen, who may be by law exempted from taxation, and who may be, in all other respects, qualified as above mentioned.

CONNECTICUT. The colonial charter granted by Charles II. in 1662, was the basis of the government till the year 1818, when the present constitution was adopted.

*Legislature.* This consists of a Senate and House of Representatives, styled the *General Assembly of Connecticut.* The Senate must consist of not less than eighteen, nor more than twenty-four members, chosen by districts. Members of the House of Representatives are chosen by towns; old towns elect two; newly incorporated towns but one. Annual election first Monday in April. Stated annual session of the General Assembly first Wednesday in May, alternately at Hartford and at New Haven.

*Executive.* A Governor chosen annually by the people, on the first Monday in April. He must be an elector, and have arrived at the age of thirty years. All commissions issued in the name and by the authority of the state, receive his signature. He has a qualified negative upon the acts of the General Assembly. He has power to grant reprieves, but cannot pardon, that power residing in the General Assembly. The Lieutenant Governor is President of the Senate.

*Judiciary.* A Supreme Court of Errors, a Superior Court, and such other Courts as the General Assembly may establish. All judges are appointed by the General Assembly. Those of the Supreme and Superior Courts hold their offices during good behavior, but are disqualified at the age of seventy.

*Right of Suffrage.* This extends to all white males of twenty-one years of age and upwards, who are resident citizens for six months and have a freehold of seven dollars yearly value, or who shall have performed military duty for one year, or paid a tax, provided they sustain a good moral character.

RHODE ISLAND. This state is without a written constitution; and in this respect forms an exception to the other States of the Union. The government of this State is administered according to the *charter* granted to the Colony by Charles II. in 1663.

*Legislature.* A General Assembly composed of a Senate and House of Representatives. The latter consists of seventy-two members, six from Newport, four from each of the towns of Providence, Portsmouth, and Warwick, and two from each of the other towns in the State. Election semi-annual, in April and August. The Senate consists of ten members. Election annual in April.

*Executive.* A Governor elected annually in April. Powers very limited. In case of his disability, the executive duties devolve on a Lieutenant Governor.

*Judiciary.* A Supreme Court and Courts of Common Pleas; the latter established in the several counties. Judges appointed annually by the General Assembly, which meets four times a year; first at Newport, in May, and at the same place in June. In October, alternately at Providence and South Kingston; and by adjournment in January, at East Greenwich, Bristol, or Providence.

New York. This State adopted a constitution in 1777, which was amended in 1801. A new constitution was framed in 1821.

*Legislature.* The legislative power is vested in a House of Representatives and a Senate, the members of the former of which must be citizens resident for a certain time, and cannot exceed one hundred and twenty-eight in number. The members of the Assembly are chosen by the counties, and are apportioned according to their population. The Senate consists of thirty-two members, who are chosen in eight districts; one is elected in each district every year. The annual election is held sometime in the month of October or November. Meeting of the Legislature first Tuesday in January, at *Albany.*

*Executive.* The executive power is vested in a Governor, who is chosen every two years. He must be a native citizen, a freeholder, and resident in the State five years, and must have attained to the age of thirty years. He has the right of nominating judicial and executive officers to the Senate—has a qualified negative upon the acts of the Legislature, and the power of pardoning, except in cases of treason. A Lieutenant Governor is elected at the same time with the Governor, and in case of impeachment, resignation, death, or absence of the latter, assumes the government. He is President of the Senate.

*Judiciary.* This branch of the government comprises too many tribunals to admit of a particular notice of each. The Chancellor and all the Judges of the State, receive their appointment from the Governor, with the consent of the Senate. The Chancellor and Justices of the Supreme and Circuit Courts retain their offices during good behavior, but are disqualified at sixty years of age. Judges of the County Courts, or Courts of Common Pleas, are appointed for five years. Justices of the Peace are chosen by the people in their respective towns, once in four years, but if a Justice becomes an inn-holder, he is thereby disqualified.

*Right of Suffrage.* In the constitution adopted by this State in 1821, the right of suffrage, in the election of public officers, was granted to every white male citizen of the age of twenty-one years, who should be an inhabitant of the State one year preceding any election, and for the preceding six months a resident in the county, where he should offer his vote; but in November, 1826, this rule was set aside, and the principle of universal suffrage adopted. Free colored people only must be freeholders to be electors.

New Jersey. The constitution of New Jersey was formed in the year 1776, since which it has continued without alteration to the present time, except that the word *Colony* has been changed to State; but

the legislature has at various times explained its provisions in relation to particular parts.

*Legislature.* This body, in New Jersey, comprises the Governor Legislative Council, and General Assembly. The General Assembly consisted, until 1829, of forty-three members, but in that year seven members were added. All the members of the General Assembly, as well as the members of the Legislative Council, are elected annually on the second Tuesday of October. The number of this latter body is fourteen, one from each county. These must be worth at least one thousand pounds each. Members of the Assembly must be worth five hundred pounds. Meeting of the Legislature annually, on the fourth Tuesday in October, at *Trenton.*

*Executive.* A Governor is chosen by the Council and Assembly, annually, in joint ballot. The Governor presides in the Council; but a Vice President is chosen from the council, who presides in the Governor's absence. The Governor exercises the office of Chancellor, of Military Chief, &c. With the Council, he forms a court of Appeals, and in them the power of pardoning criminals after condemnation, is vested.

*Judiciary.* A Supreme Court and the usual inferior Courts. Judges receive their appointment from the Legislature, those of the Supreme Court for seven years; those of the lower Courts for five years.

*Right of Suffrage.* The language of the constitution on this point is, "That all persons of full age shall have a right to vote, who are worth fifty pounds proclamation money, clear estate in the same, and have resided in the county in which they claim to vote, for twelve months immediately preceding the election." By a special act of the Legislature, every white male inhabitant, of lawful age, and who had paid a tax, is considered worth fifty pounds, and therefore entitled to vote.

Pennsylvania. The first constitution of Pennsylvania was adopted in 1776: the present in 1790, and has not since been altered.

*Legislature.* Senate and House of Representatives compose the General Assembly, in which the legislative power resides. The annual election of representatives is on the second Tuesday in October. Number of representatives is not less than sixty nor more than one hundred, chosen by districts. The qualifications which are necessary to a seat are, twenty-five years of age, citizenship and residence. The number of Senators shall never be less than one quarter, nor greater than one third the number of Representatives. They are chosen for four years, one quarter being elected annually. Senators must be twenty-five years of age, and have been citizens and inhabitants four years, before they are elected, and the last year inhabitants of the district in which they are elected. Annual meeting of the General Assembly, first Tuesday in December.

*Executive.* A governor elected by the people, on the second Tuesday in October; holds his office three years, and can be chosen only thrice in twelve years. Nearly all officers are appointed by him. There is no Lieutenant Governor; but the President of the Senate succeeds in case a vacancy occurs in the office of Governor. The Governor must be thirty years of age, and have been a citizen and resident of the State

seven years next before his election. He may grant reprieves and pardons, except in cases of impeachment.

*Judiciary.* The Judicial power is vested in a Supreme Court, in Courts of Oyer and Terminer, and general gaol delivery; in a Court of Common Pleas, Orphan's Court, Register's Court, and a Court of Quarter Sessions of the Peace, and in such other courts as the Legislature may from time to time establish. Judges receive their appointment from the Governor, and hold their office during good behavior. They may, however, be removed on impeachment, or on address to the Governor by two thirds of the legislature.

*Right of Suffrage.* This pertains to citizens of the age of twenty-one years, who have resided in the State two years next before the election, and within that time paid a state or county tax, assessed at least six months before the election.

DELAWARE. The constitution of this State was adopted in 1792, since which time it has not been materially altered.

*Legislature.* The legislative power is vested in a General Assembly, consisting of a Senate and House of Representatives. The Representatives are chosen annually, and consist of seven from each county, or twenty-one in the whole. Senators are chosen for three years; three from each county, or nine in the whole. One from each county is chosen annually. Representatives must be twenty-four years of age, have a freehold in the county, and have been citizens and inhabitants of the State for three years next preceding the election. Senators must be of the age of twenty-seven years, with a freehold of two hundred acres of land, or personal property to the amount of one thousand pounds. Annual meeting of the General Assembly, on the first Tuesday in January at *Dover.*

*Executive.* Governor elected by the people for three years; but cannot hold the office more than three years in six. He must be at least thirty-six years of age, have been a citizen and inhabitant of the United States twelve years, and the last six an inhabitant of that State. He has the power of appointing all officers, and the power of pardoning, except in impeachments.

*Judiciary.* The same as in Pennsylvania, with the addition of a Court of Chancery. The Chancellor and Judges of the Supreme Court and Court of Common pleas, hold their office during good behavior, but may be removed as in Pennsylvania.

*Right of Suffrage.* The same as in Pennsylvania.

MARYLAND. The constitution of this state was adopted in 1776. It has undergone various amendments. It grants the singular power of amending the constitution, to the Legislature, independently of the express vote of the people.

*Legislature.* This consists of two distinct branches, a Senate of fifteen members, and a House of Delegates of eighty members, which united, are styled *the General Assembly of Maryland.* Senators are chosen every fifth year by Electors, who are chosen by the people a year before hand. Senators must be twenty-five years of age, and have resided three years next preceding the election, in the State. Delegates must be citizens, and have resided in the State one year next preceding the election. The latter are chosen annually by the people. Meeting on the last Monday in December.

*Executive.* Governor elected annually on the first Monday of January, by a joint ballot of both houses of the General Assembly. He may be chosen successively for three years, and is then ineligible for four years. He must be of the age of twenty-five years, and have been a resident citizen for five years. He is assisted by a Council of five members, chosen annually by joint ballot of the Senate and House of Delegates. The Governor nominates to office, and the Council appoints.

*Judiciary.* The Chancellor and Judges are appointed by the Governor and Council, and may be removed by address of two thirds of the Legislature, and by conviction on an indictment in a court of justice.

*Right of Suffrage.* This pertains to every free male white citizen of this state, above twenty-one years of age, who has resided twelve months in the State, and six months in the county, or in the city of Baltimore or Annapolis, next preceding the election at which he offers to vote.

VIRGINIA. The first constitution of this state was formed in 1776. An amended constitution was adopted by a Convention, on the fourteenth of January, 1830, and has gone into operation the present year, 1831.

*Legislature.* The legislative power is vested in a General Assembly, composed of a Senate and House of Delegates. The number of the former is thirty-two, chosen from two districts, into which the State is divided. They are chosen for four years. One fourth are annually renewed by popular election. The House of Delegates consists of one hundred and thirty-four members, apportioned in four districts—chosen annually by the people. Members of both houses must be freeholders. Their meeting is annual, but the time is to be fixed by the General Assembly. After the year 1841, the number of delegates may be one hundred and fifty, and the Senators thirty-six.

*Executive.* A Governor, elected by a joint vote of the two Houses of the General Assembly—holds his office for three years; can be elected but once in six years, must be of the age of thirty, &c. He is assisted by a Council of three, chosen as the Governor is, the senior of whom is Lieutenant Governor.

*Judiciary.* The Judges of the Supreme Court of appeals, and of the Superior Courts, are elected as is the Governor—hold their offices during good behavior, but may be removed on address or impeachment.

*Right of Suffrage.* The law on this subject is so constructed, as to make this right nearly universal. "Every white male citizen of the Commonwealth, of the age of twenty-one, resident therein, has the right, who is qualified according to the former constitution and laws; or who owns a freehold of the value of twenty-five dollars; or who has a joint interest to the amount of twenty-five dollars in a freehold; or who has a life estate in, or a reversionary title to, land of the value of fifty dollars, having been so possessed for six months; or who shall own and be in actual occupation of a lease hold estate, having the title recorded two months before he shall offer to vote—of a term originally not less than five years, and of the annual value or rent of two hundred dollars, or who, for twelve months before offering to vote—has been a

house keeper and head of a family, and shall have been assessed with a part of the revenue of the Commonwealth, within the preceding year, and actually paid the same.

North Carolina. The constitution of North Carolina was framed in 1776, and has never been amended, and is silent as to any provisions for amendment.

*Legislature.* A General Assembly, composed of a Senate and House of Commons, both elected annually by the people. Each of the sixty-two counties in the State sends one Senator and two Delegates, and the towns of Edenton, Newbern, Wilmington, Salisbury, Hillsborough, and Halifax send one. Senators and Representatives must be freeholders, and been residents one year.

*Executive.* Governor chosen annually, by a joint vote of the two Houses is eligible for three years only in six—must be a freeholder, thirty years of age, and a resident five years. He is assisted by a Council of seven, chosen annually by the General Assembly. The executive have the power of pardon. They may be removed by impeachment, and what may be considered singular, by presentment of a grand jury.

*Judiciary.* The judges of the higher courts are appointed by the General Assembly, and hold their office during good behavior. They may be removed on impeachment, or indictment.

*Right of Suffrage.* To vote for a member of the House of Commons, a freeman must be of the age of twenty-one years, and have resided in the State 12 months immediately preceding the election. To vote for Senator, he must in addition possess a freehold of 50 acres of land.

South Carolina. A constitution was adopted by this State in 1775; the present constitution was adopted in 1790. The latter has been twice amended, first, in 1808, and again in 1816.

*Legislature.* A General Assembly, consisting of a Senate and House of Representatives, the former consists of 45 members, chosen in election districts, for four years, one half renewed biennially. The latter consists of 124 members, elected for two years, and are chosen by districts. Senators must be resident citizens for five years, 30 years of age, and freeholders; Representatives must be resident citizens for three years. Meeting of the General Assembly annually, at Columbia, fourth Monday in November.

*Executive.* Governor elected by the General Assembly for 2 years—re-eligible after four years—must be a freeholder—a citizen resident for ten years—30 years of age. He has the power of pardoning. A Lieutenant Governor of like qualifications is chosen in the same manner, and for the same period; but has no power or duty, unless a vacancy happens in the office of Governor.

*Judiciary.* The judicial power is vested in superior and inferior courts of law and equity. The Chancellor and Judges are chosen by the General Assembly in joint ballot, and hold their office during good behavior.

*Right of Suffrage.* This is granted to every free white male citizen of the age of 21 years, resident two years, a freeholder of fifty

acres of land, or has paid a tax the preceding year of three shillings sterling towards the support of government.

GEORGIA. Georgia first formed a constitution in 1777; a second in 1785; and a third, which is now in operation, in 1798. This last has been amended in respect to one judicial provision.

*Legislature.* A General Assembly, consisting of a Senate and House of Representatives. The annual election is on the first Monday in Oct. Each county elects one senator. The representatives are in proportion to population, adding three to three-fifths of the colored population. Each county has, however, the privilege of sending one, and no county more than four. The meeting of the general assembly takes place on the first Monday of November.

*Executive.* The executive power is vested in a Governor, elected by the people on the first Monday in Oct.—holds his office for two years. He must have been a citizen of the United States twelve years—inhabitant six years—30 years of age—a freeholder of 500 acres of land, or other property to the amount of $4000. He has the power of granting reprieves for offences against the state, except in cases of impeachment, and to respite execution for treason or murder, till the next general assembly.

*Judiciary.* Superior court, and inferior jurisdictions. Judges of the superior court appointed by the General Assembly for three years—removeable by address and impeachment.

*Right of Suffrage.* The right of suffrage extends to all citizens and inhabitants who have attained the age of 21 years, and have paid all the taxes which may have been required of them, and which they may have had opportunity of paying, agreeably to law, for the year preceding the election, and shall have resided six months within the county.

KENTUCKY. The constitution of Kentucky was first formed in 1790; a new one was framed in 1799.

*Legislature.* A Senate and House of Representatives, styled *The General Assembly of the Commonwealth of Kentucky.* The senators are 38 in number—cannot fall short of 24—must be resident citizens six years, and 35 years of age—are chosen for four years—one quarter renewed annually. The number of representatives is 100—cannot be lower than 58—must be resident citizens two years—24 years of age—are elected annually by the people, by districts. Meetings of the General Assembly annually at *Frankfort,* on the first Monday of Nov.

*Executive.* Governor, elected by the people for four years, then ineligible for seven. His qualifications are citizenship—residence six years—age 35 years. He has the power of nominating to the Senate all judicial, and other important officers; also, the power of pardoning, except in cases of impeachment, and of reprieving in treason, until the next meeting of the General Assembly. A lieutenant Governor is also chosen, who is president of the Senate, and who acts as Governor, in case of a vacancy in that office.

*Judiciary.* The judges hold their office, and may be removed, as in Massachusetts.

*Right of Suffrage.* This extends to every free, male, white citizen

of the age of 21 years, who has resided in the state two years, or in the county where he votes one year next preceding.

TENNESSEE. The constitution of Tennessee was adopted in 1796, since which time it has not been amended.

*Legislature.* A General Assembly, consisting of a Senate and House of Representatives, both elected biennially, on the first Thursday and Friday in August. Number of representatives never to exceed 40, apportioned among the different counties, according to the taxable inhabitants. The number of senators, who are similarly appointed, can never be more than half, nor less than one third of the House. The meeting of the General Assembly is biennial, on the third Monday in September, at *Nashville.*

*Executive.* A Governor, elected by the people, at the same time with the senators and representatives, by a *plurality* of votes—holds his office for two years—may be elected only three times in eight years—must be a freeholder—a resident citizen for four years, and 35 years of age. He has the power of pardoning, except in impeachment. A lieutenant Governor, with the same qualifications, is chosen at the same time. The executive has the power of appointing to office only in cases of vacancy.

*Judiciary.* The Judges of the several courts of law and equity, are appointed by joint ballot of both houses of the assembly. They hold their office during good behavior.

*Right of Suffrage.* This right belongs to every freeman of the age of 21 years, and upwards, possessing a freehold in the county wherein he may vote, and being an inhabitant of the state, and to every freeman, being an inhabitant of the county in which he shall vote, six months immediately preceding the day of election.

OHIO. The constitution of this state was adopted in 1802. It may be amended by a convention, but, as yet, has experienced no change.

*Legislature.* A Senate and House of Representatives, styled *the General Assembly of Ohio.* The Senators cannot be less than one third nor more than one half the number of Representatives. They are chosen for two years; one half being renewed annually. Qualifications the same as for representatives, viz. residence one year—age 25 years, and payment of taxes. The number of representatives can never be less than 36, nor more than 72. They are elected annually, on the second Tuesday in October, by counties, according to the number of white male inhabitants, of 21 years of age. Meeting of the General Assembly annually at *Columbus*, on the first Monday in December.

*Executive.* A Governor, who is elected by the people for two years—eligible six years in eight—must be 30 years of age, and be a resident citizen four years. He has the power of pardoning, except in impeachments. The president of the Senate is his successor, in case of his disability.

*Judiciary.* A superior court, courts of common pleas for each county, &c. Judges are chosen by the General Assembly, in joint ballot, for seven years,—may be removed by impeachment.

*Right of Suffrage.* This privilege extends to white male inhabitants, above 21, who have resided in the state one year immediately preceding the election, and who have paid a state or county tax.

INDIANA. The constitution of Indiana was adopted in 1816—may be amended by convention; but has not yet been altered.

*Legislature.* A General Assembly, consisting of a Senate elected for three years—one third renewable annually; and a House of Representatives elected annually. Qualifications of senators and delegates, viz. residence and payment of taxes; they are chosen in counties and districts, and apportioned to the numbers of white male inhabitants, above 21. Delegates can never be less than 36, nor more than 100. Senators not less than one third, nor more than one half the number of Representatives. Annual general election, first Monday in August. Annual meeting of the general assembly, at *Indianopolis*, first Monday in December.

*Executive.* Governor elected by the people, for three years—eligible six years in nine—must be 30 years of age, and have been a resident citizen five years. He has the power of pardon as in Ohio, and a qualified negative on the acts of the assembly, as in Massachusetts. It belongs to him to nominate most of the officers of the state to the Senate. A Lieutenant Governor is chosen by the people, who presides in the Senate, and succeeds to the powers and duties of the Governor, in case of the disability of the latter.

*Judiciary.* A supreme court, circuit courts, &c. The supreme court has three judges: and each of the circuit courts a president, and two associate judges. The judges hold their offices for seven years—those of the supreme court are appointed by the Governor and Senate; the president of the circuit courts by the assembly in joint ballot; and the associate judges are chosen by the people.

*Right of Suffrage.* This is granted to all male citizens of the age of 21 and upwards, who have resided in the state a year immediately preceding an election.

LOUISIANA. The constitution of this state was formed in 1812; provision is made for its amendment by a convention, chosen by the people.

*Legislature.* House and Senate, styled General Assembly. Representatives are elected for two years—cannot be less than 25, nor more than 50, and are chosen on the basis of the qualified electors, as ascertained by enumeration every four years. They must be citizens, and residents two years, and freeholders. The Senators are 16 in number, chosen by districts, for four years—half to be renewed every two years. They must have been resident citizens four years—27 years of age, and possess a freehold worth $1000. Annual meeting of the Assembly, first Monday in January.

*Executive.* A Governor, who is elected for four years, and is ineligible the next four years. He is chosen by the General Assembly in joint ballot, who elect one of the two candidates who have had the greatest number of votes from the qualified electors. Qualifications—residence six years—30 years of age—and a freehold of $5000 value. With the assent of the Senate he has the power of pardoning;

but not in cases of impeachment. The president of the senate is his successor, in case of vacancy.

*Judiciary.* Supreme court, and such inferior courts as the Legislature may establish. The judges are appointed by the Governor, with the advice and consent of the Senate—they hold their offices during good behavior.

*Right of Suffrage.* This is practically universal.

MISSISSIPPI. Constitution adopted 1817, with provisions for its being amended by convention.

*Legislature.* House of Representatives and Senate, styled General Assembly. The number of Representatives can never be less than 36, nor more than 100. They must be resident citizens two years—22 years of age, and possess a freehold to the value of $500. Senators are elected for three years—one third renewable annually—are chosen in districts, being apportioned on the taxable inhabitants—can never be more than one third, nor less than one fourth of the delegates—must be resident citizens four years—26 years of age—freehold or other estate of 1000 dollars. Annual session, first Monday in November.

*Executive.* A Governor, elected by the people for two years—must be 30 years of age—a citizen 20 years—a resident five years—and have a freehold of the value of $2000. He has no power of appointment, but can pardon, except in cases of treason, or impeachment. A Lieutenant Governor is appointed, who acts in case of the death, resignation, or absence of the Governor. He is president of the Senate.

*Judiciary.* One supreme court, and such superior and inferior courts of law and equity, as the Legislature may from time to time establish. Number of the supreme and superior courts not less than four, nor more than eight. All judges are appointed by the General Assembly—hold their office during good behavior—are disqualified at the age of 65.

*Right of Suffrage.* This extends to every free white male person 21 years of age, or upwards—who is a citizen of the United States, and shall have resided in this state one year next preceding the election—and the last six months within the county, city or town, in which he offers to vote, and shall be enrolled in the militia thereof, unless exempted by law from military service; or having the aforesaid qualifications of citizenship, and residence, shall have paid a state or county tax.

ILLINOIS. ALABAMA. MISSOURI. The constitutions of these states were established in the years, 1818, 1819, and 1820. Their provisions are, in general, so strikingly similar to those of the constitution of Mississippi, that it is deemed unnecessary to enter in particulars. In Illinois, the number of representatives cannot be less than 27, nor more than 36, until the number of inhabitants within the state shall amount to 100,000; and the number of senators shall never be less than one third, nor more than one half the number of representatives. In this state, also, the Governor, with the judges of the supreme court, constitute a council to revise all legislative acts; upon which they have a

qualified negative. Session of the Assembly, first Monday of December, every second year. In Alabama, annual session, fourth Monday of October. In Missouri, meeting of the Assembly, first Monday in November, every second year.

Constitution of the United States. The United States were originally colonies of Great Britain. At several different times, a union between these colonies was contemplated and attempted. In the year 1643, a union was formed between the New England colonies for certain purposes. In 1754 a more general union was attempted, according to a plan, which, in several of its features, resembled the present constitution of the United States; and, although adopted by a convention of delegates from Massachusetts, New Hampshire, Rhode Island, Connecticut, Pennsylvania, Maryland, with the Lieutenant Governor and council of New York, it failed, receiving the approbation of neither the provincial assemblies, nor of the King's Council.

In the summer of 1775, after the troubles with the mother country had commenced, Dr. Franklin submitted to Congress articles of confederation and perpetual union between the colonies, but which were not then acted upon. In June 1776, Congress being about to declare America independent, the subject of a compact was again brought forward. A committee was appointed to prepare, and digest the form of a confederation. This committee, on the 12th of July following, reported a plan consisting of twenty articles. The gloomy aspect of American affairs at that period, however, prevented Congress from resuming the subject, until April 1777; nor was it finally adopted, until the 15th of November, the same year. The outlines of the system were, that the thirteen states formed a confederacy, under the style and name of "The United States of America;" by which they entered "into a firm league of friendship with each other, for their defence, the security of their liberties, and their mutual and general welfare, binding themselves to assist each other against all force offered to, or attacks made upon them, or any of them, on account of religion, sovereignty, trade, or any other pretence whatever."

This plan of union, after much difficulty and delay, was adopted by the then thirteen colonies; and, although defective in many respects, the American people were held together, by means of it, through their long struggle for peace and independence.

At length it was obvious, that a more effective plan of union must be adopted, or the glorious objects of the Revolutionary struggle would be entirely lost. To trace the progress of measures, which led to the adoption of the Federal Constitution, would greatly exceed our limits. It is sufficient for our purpose to say, that in the year 1787, a convention of delegates from all the states, except Rhode Island, met in the city of Philadelphia, and on the 17th of September, the present federal constitution was presented to Congress, which body shortly after sent it to the several states, by which it was, at different, periods, adopted, and with some subsequent amendments, has formed the basis of our government until the present time.

*Legislative power.* The legislative power is vested by the constitution in a Congress, which consists of a House of Representatives, and a Senate, the concurrence of both of which is necessary to the making of

a law. A bill which has passed both branches, must be signed by the presiding officers, which being done, it is sent to the President for his signature. If he signs it, it is established as law—should he refuse, he returns it with objections. Should two thirds of both branches concur, it becomes a law notwithstanding the want of the President's signature.

The House of Representatives is composed of members from the several states, chosen by the people, for the term of two years, in such manner as each state, by law, determines. They are apportioned among the different states, according to the population—each state, at the present time, according to an act of Congress, of the 3d of March, 1823, sending one representative for every 40,000 persons, computed according to the constitution. No person can be a representative who is not 25 years old, and who has not been a citizen seven years, and who does not reside in the state in which he is elected. The present number of representatives is 216, including three delegates.

The Senate is composed of two members from each State. The present number is forty-eight. They are chosen by the State Legislatures for six years, one third being elected biennially. To be eligible to a seat in the Senate, a person must be thirty years of age, a resident citizen 9 years, an inhabitant of the State in which he is chosen.

The House of Representatives has a presiding officer called a Speaker, who is elected from their own body. The President of the Senate is the Vice President of the United States.

Besides the legislative power, which the Senate has in common with the House of Representatives, it belongs to that body to approve or disapprove of appointments made by the President. Treaties, also, with foreign powers, are submitted to them, by the President; two thirds are essential to the ratification of a treaty. The Senate also acts as a judicial court for the trial of impeachments, the House of Representatives being the prosecutor.

It belongs to Congress to make such laws, compatable with the constitution, as in their opinion will advance the general welfare of the country. "They are to lay and collect taxes, imposts and exeises; borrow money, regulate commerce, establish uniform rules of naturalization, coin money, establish post roads and post offices, promote the arts and sciences, institute tribunals inferior to the supreme court, define and punish piracy, declare war, and make reprisals, raise and support armies, provide a navy, regulate the militia, and make all laws necessary to carry these powers into effect."

*Executive power.* The executive power of the United States is vested in a President, who holds his office for four years. He is chosen by electors, who are themselves chosen in each state, in such a manner as the legislature may direct, and are in number equal to the number of Senators and Representatives in each State.

The importance of the mode in which the election of President is made, induces us to insert the provisions of the constitution, on this subject, as amended: "The electors shall meet in their respective States and vote by ballot for President and Vice President one of whom, at least, shall not be an inhabitant of the same State with themselves. They shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President:

and they shall make distinct lists of all persons voted for as president, and of all persons voted for as vice president, and of the number of votes for each; which lists they shall sign and certify, and transmit, sealed, to the seat of government of the United States, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all certificates, and the votes shall then be counted. The person having the greatest number of votes for president shall be the president, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then, from the persons having the highest numbers, not exceeding three, on the list of those voted for as president, the House of Representatives shall choose immediately, by ballot, the president. But in choosing the president, the votes shall be taken by states, the representation from each state having one vote. A quorum for this purpose shall consist of a member, or members, from two thirds of the states; and a majority from all the states shall be necessary to a choice. And if the House of Representatives shall not choose a president, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the vice president shall act as president, as in the case of the death or other constitutional disability of the president.

"(2) The person having the greatest number of votes as vice president, shall be the vice president, if such a number be a majority of the whole number of electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the vice president. A quorum for the purpose shall consist of two thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice.

"(3) But no person constitutionally ineligible to the office of president, shall be eligible to that of vice president of the United States." The qualifications and duties of the president will be noticed in another page.

*Judiciary.* The judicial power of the United States is at present vested in a Supreme Court, thirty-one District Courts, and seven Circuit Courts. The Supreme Court is composed of a chief justice and six associate justices, who hold a court in the city of Washington annually. The Circuit Courts, comprising two or more Districts, are attended by these justices, to each of whom one is appropriated. He is assisted by the judge of the district in which the Court is held. The District Courts are held by the district judge. Appeals lie from the District to the Circuit Courts, and from the Circuit Courts to the Supreme Courts. Each court has a clerk, a public attorney, and a marshall, all of whom receive their appointment from the President of the United States, with the exception of the clerks, who are appointed by the courts. The judges hold their offices during good behavior, and their salaries cannot be diminished during their continuance in office. The power of these courts extends to all cases in law and equity, arising under the constitution, or laws of the United States, and under treaties; to cases of public ministers and consuls; to all cases of admiralty and maritime jurisdiction; to controversies between the states, in which the United States are a party; between a state and a citizen of another state; and between citizens of different states; between citizens of the same state, claiming under grants of different states; to causes between one of the states or an American citizen, and a foreign state or citizen.

# PART IX.

## STATISTICS.

By statistics is meant a collection of facts respecting the state of society, the condition of the people in a nation or country, their health, longevity, domestic economy, arts, property, and political strength, the state of the country, &c.

Although the ancients appear to have had some practical knowledge of this subject, yet it was extremely limited, and doubtless very imperfect. As a science, statistics is of very recent origin, having for its founder, Achenwall, a professor of Gottingen University. In 1748 he published a valuable work on statistics, the plan of which has served as the basis of several other still more valuable and later treatises.

Hitherto, individuals have paid more attention to statistical information than governments; yet it would obviously be for the advantage of every regular government, to provide for detailed reports on those subjects, which would elicit a view of the statistical condition of the countries where they are established. Most governments provide for an enumeration of their inhabitants and the revenue; but in respect to a periodical census, extending to all the important branches of statistical knowledge, it is believed that England and the United States are the only two governments which have made legal provision. In the former country, the first census of the above kind was made in 1811. In the latter, in 1790. In both countries, the census is repeated every ten years.

### STATISTICS OF THE UNITED STATES.

#### POPULATION OF THE AMERICAN COLONIES IN 1701.

| | SOULS. | | SOULS. |
|---|---|---|---|
| Massachusetts | 70,000 | New York | 30,000 |
| Connecticut | 30,000 | East and West Jersey | 15,000 |
| Rhode Island | 10,000 | Pennsylvania | 20,000 |
| New Hampshire | 10,000 | Maryland | 25,000 |
| | | Virginia | 40,000 |
| New-England | 120,000 | North Carolina | 5,000 |
| Middle and So. Colonies | 142,000 | South Carolina | 7,000 |
| Total | 262,000 | | 142,000 |

#### POPULATION OF THE COLONIES IN 1749.

| | | | |
|---|---|---|---|
| New Hampshire | 30,000 | Pennsylvania, Delaware | 250,000 |
| Massachusetts | 220,000 | | |
| Rhode Island | 35,000 | Maryland | 85,000 |
| Connecticut | 100,000 | Virginia | 85,000 |
| New York | 100,000 | North Carolina | 45,000 |
| East and West Jersey | 60,000 | South Carolina | 30,000 |
| | | Georgia | 6,000 |

## STATISTICS.

### DATES OF THE FIRST SETTLEMENT OF THE SEVERAL COLONIES.

| | | | |
|---|---|---|---|
| Virginia | 1607 | Maryland | 1633 |
| New York | 1614 | Connecticut | 1635 |
| Massachusetts | 1620 | Rhode Island | 1636 |
| New Hampshire | 1623 | North Carolina | 1650 |
| New Jersey | 1624 | South Carolina | 1670 |
| Delaware | 1627 | Pennsylvania | 1682 |
| Maine | 1630 | Georgia | 1733 |

### EXPENSE OF THE WAR OF THE REVOLUTION.

During the war of the revolution, commerce, being interrupted, no revenue was raised from this branch of industry, nor had the Continental Congress the power to lay a general tax on commerce, this being the exclusive prerogative of the several States. Resort was therefore necessarily had to loans and paper money. Owing to various causes the precise amount of expenditures for the war cannot be ascertained. The following estimate is supposed to approximate to the expense incurred.

| Estimated expenditures, | Dolls. 90ths. |
|---|---|
| of 1775 and 1776, in specie, | 20,064,666 66 |
| 1777 | 24,986,646 85 |
| 1778 | 24,289,438 26 |
| 1779 | 10,794,620 65 |
| 1780 | 3,000,000 00 |
| 1781 | 1,942,465 30 |
| 1782 | 3,632,745 85 |
| 1783 | 3,226,583 45 |
| To Nov. 1st. 1784 | 548,525 63 |
| Forming an amount total of | $92,485,693 15 |
| To which should be added— | Dolls. 90ths. |
| Army debt upon Commissioners' certificates, | 11,080,576 1 |
| Supplies furnished by citizens of the several States | 3,723,625 21 |
| Supplies furnished from the quarter-master's department, commissary, &c. | 1,159,170 5 |
| Other supplies, certificates for which were issued by Register, | 744,638 49 |
| The foreign expenditures, civil, military, &c. | 5,000,000 00 |
| Estimated expenditures of the several States, | 21,000,000 00 |
| Estimated expense of the war in specie, | $135,193,703 00 |

### EMISSIONS OF CONTINENTAL MONEY.

| | Old Emission. Dolls. 90ths. | New Emission. Dolls. 90ths. |
|---|---|---|
| In 1776 | 20,064,666 66 | |
| 1777 | 26,426,333 1 | |
| 1778 | 66,965,269 34 | |
| 1779 | 149,703,856 77 | |
| 1780 | 82,908,320 47 | 891,236 80 |
| 1781 | 11,408,095 00 | 1,179,249 00 |
| | $357,476,541 45 | $2,070,485 80 |

## STATISTICS.

### LOANS AND GRANTS OF MONEY FROM FRANCE.

| | Livres. | Dollars. |
|---|---|---|
| 1778. *February* 6—Cash received from sundry individuals up to this day, including a loan from the Farmers General, - - | 3,000,000 | 555,555 |
| " Loan by the Court of France for this year, | 3,000,000 | 555,555 |
| 1779.—Loan for this year, - - - | 1,000,000 | 185,185 |
| 1780.—Loan, - - - - | 4,000,000 | 740,740 |
| 1781.—Loan, - - - - | 4,000,000 | 740,740 |
| " Subsidy from the Court of France, - | 6,000,000 | 1,111,111 |
| " Loan granted by the Court of Holland, | 10,000,000 | 1,851,851 |
| 1782.—Loan, - - - - | 6,000,000 | 1,111,111 |
| 1783.—Loan, - - - - | 6,000,000 | 1,111,111 |
| | 43,000,000 | 7,962,959 |

### TROOPS EMPLOYED DURING THE REVOLUTION.

[From Dr. Holmes' Annals.]

*Land forces employed by Great Britain in America*, 1774—1780.

| | | | | | |
|---|---|---|---|---|---|
| 1774 | 6,884 | Died and deserted | 19,381 | Lost of the army | 24,717 |
| 1775 | 11,319 | Prisoners | 5,336 | Lost of the navy | 4,314 |
| 1776 | 45,865 | | | | |
| 1777 | 48,616 | | 24,717 | | 29,031 |

*Naval force for the above four years.*

| | |
|---|---|
| Men of war and armed vessels, - - - - - - - | 83 |
| Complement of men, - - - - - - - | 22,337 |
| Of which were lost by death, - - - - - - - | 4,314 |

*Men and Marines employed by Great Britain during the American War.*

Raised for his Majesty's navy, marines included, from September 29, 1774, to September 29, 1780, - - - 175,990

Of whom in 5 years, beginning with 1776, and ending with 1780,

| | | |
|---|---|---|
| Died | 18,545 | 19,788 total. |
| Were killed | 1,243 | |
| Deserted | 42,069 | |

*Troops raised in Great Britain and Ireland, for his Majesty's Land Service, (Militia and Fencible Men in North Britain not included) from September* 29, 1774, *to September* 29, 1780, 76,885

| | |
|---|---|
| Of which died in North America and the West Indies | 10,012 |
| Taken prisoners, including those under the Convention of Saratoga - - - - - | 8,629 |
| Deserted - - - - - | 3,801 |
| Discharged the service - - - - - | 3,885 |
| | 26,327 |

STATISTICS.

*British Corps and Recruits sent from Great Britain or Ireland to North America or the West Indies.*

| | | |
|---|---|---|
| 1778 | 3774 | Total, 20,882. |
| 1779 | 6871 | |
| 1780 | 10,237 | |

*Account of the ships of the Line and Frigates, taken or destroyed during the War of the Revolution.*

| | | |
|---|---|---|
| French ships of the line taken by the British | 13 | 26 |
| Do. lost | 13 | |
| Spanish ships of the line taken by do. | 7 | 12 |
| Do. lost | 5 | |
| Dutch ships of the line taken by do. | 3 | 7 |
| Do. lost | 4 | |
| American ship of the line taken by do. | | 1 |

Taken 23, lost 23. Total 46.

French frigates taken 27, American 12, Spanish 11, and Dutch 2; beside which, 5 Spanish, and 4 American frigates were lost. Total 61.

| | | |
|---|---|---|
| British, one 64 and two fifties taken by the French | 3 | 18 |
| Do. ships of the line lost | 15 | |

British frigates taken by the French, 6, by the Americans 1, and 17 lost. Total 24.

NAVAL FORCE OF THE UNITED STATES.

| Names and rate. | Guns. | When built. |
|---|---|---|
| *Ships of the line.* | | |
| Independence | 74 | 1814 |
| Franklin | 74 | 1815 |
| Washington | 74 | 1816 |
| Columbus | 74 | 1819 |
| Ohio | 74 | 1820 |
| North Carolina | 74 | 1820 |
| Delaware | 74 | 1820 |
| *Frigates of the 1st Class.* | | |
| United States | 44 | 1797 |
| Constitution | 44 | 1797 |
| Guerrier | 44 | 1814 |
| Java | 44 | 1814 |
| Potomac | 44 | 1821 |
| Brandywine | 44 | 1825 |
| Hudson | 44 | 1826 |
| *Frigates of the 2d Class.* | | |
| Congress | 36 | 1799 |
| Constellation | 36 | 1797 |
| Macedonian | 36 | 1812† |
| *Sloops of War.* | | |
| John Adams | 24 | 1799 |
| Cyane | 24 | 1815† |
| Erie | 18 | 1813 |
| Ontario | 18 | 1813 |
| Peacock | 18 | 1813 |
| Boston | 18 | 1825 |
| Lexington | 18 | 1825 |
| Vincennes | 18 | 1826 |
| Warren | 18 | 1826 |
| Natches | 18 | 1827 |
| Falmouth | 18 | 1827 |
| Fairfield | 18 | 1828 |
| Vandalia | 18 | 1828 |
| St. Louis | 18 | 1828 |
| Concord | 18 | 1828 |
| *Schooners, &c.* | | |
| Dolphin | 12 | 1827 |
| Grampus | 12 | 1821 |
| Porpoise | 12 | 1820 |
| Shark | 12 | 1821 |
| Fox | 3 | 1823* |
| Alert (store ship | | 1812† |
| Sea Gull (Galliot,) | | 1823* |

* Purchased in. † Captured.

STATISTICS.

ADOPTION OF THE FIRST STATE CONSTITUTION.

| | | |
|---|---|---|
| New Hampshire, | January 5, - - - - - | 1776 |
| South Carolina, | March 24, - - - - - | 1776 |
| Virginia, | June 29, - - - - - | 1776 |
| New Jersey, | July 2, - - - - - | 1776 |
| Maryland, | August 14, - - - - - | 1776 |
| Pennsylvania, | September, - - - - - | 1776 |
| Delaware, | September, - - - - - | 1776 |
| North Carolina, | December, - - - - - | 1776 |
| New York, | April, - - - - - | 1777 |
| Massachusetts, | March, - - - - - | 1780 |
| Vermont, | July 4, - - - - - | 1786 |
| Georgia, | May, - - - - - | 1789 |

2. *Amount of Money expended in each State and Territory, by the United States, upon works of Internal Improvement, from the adoption of the Federal Constitution, to the 1st day of October*, 1828.

| | | | |
|---|---|---|---|
| Maine, - - | $11,724 22 | Tennessee, - | $4,200 00 |
| Massachusetts, - | 104,042 46 | Ohio, - | 390,159 03 |
| Connecticut, - | 2,069 97 | Indiana, - | 108,123 88 |
| Rhode Island, - | 195 19 | Mississippi, - | 49,385 52 |
| New York, - | 68,138 45 | Illinois, - | 8,000 00 |
| Pennsylvania, - | 39,728 32 | Alabama, - | 81,762 78 |
| Delaware, - | 307,104 01 | Missouri, - | 22,702 24 |
| Maryland, - | 10,000 00 | Arkansas, - | 44,690 00 |
| Virginia, - | 150,000 00 | Michigan, - | 48,607 95 |
| North Carolina, - | 1,000 00 | Florida, - | 799,002 01 |
| Kentucky, - | 90,000 00 | | |
| | | Total | $2,341,136 03 |

| | |
|---|---|
| Road from Cumberland to the Ohio - - - | 1,662,246 75 |
| Continuation of the Cumberland Road - - - | 453,547 86 |
| Repairs of the Cumberland Road - - - - - | 55,501 00 |
| Road from Nashville to Natchez - - - - - | 8,000 00 |
| Road from Wheeling to the Mississippi river - - | 10,000 00 |
| Road from Missouri to New Mexico - - - - | 30,000 00 |
| Road from Mississippi to the State of Ohio - - | 5,539 35 |
| Road from Georgia to New Orleans - - - | 5,500 00 |
| Roads in Tennessee, Louisiana, and Georgia - - | 15,000 00 |
| Road from Nashville to New Orleans - - - | 7,920 00 |
| Surveys of Roads and Canals - - - - - | 166,681 49 |
| Surveys of Maps and Charts of the Ohio and Mississippi rivers - - - - - - - - - - | 4,185 94 |
| Improving the Navigation of the Ohio and Mississippi rivers - - - - - - - - - - | 103,409 72 |
| Military Roads - - - - - - - - - - | 10,218 43 |
| Surveys of the water courses of the Mississippi river - | 11,122 04 |
| Road through the Creek Nation - - - - - | 3,621 01 |
| Opening the old Natchez Road - - - - - | 5,000 00 |
| Breakwater at the mouth of Delaware Bay - - | 5,000 00 |
| Grand Total | $4,903,637 92 |

## STATISTICS.

### PUBLIC DEBT.

*Amount of the Public Debt of the United States, at several periods, from 1791 to 1830, reckoned on the first of January of the different years.*

| | | |
|---|---|---|
| In 1791 | $75,169,974 | Debt increased during these six years, except 1794, when it was reduced. |
| In 1796 | 81,642,272 | |
| In 1799 | 77,399,909 | Debt increased by reason of military preparations against France, previous to the year 1801. |
| In 1801 | 82,000,167 | |
| In 1803 | 74,731,922 | |
| In 1804 | 85,353,643 | Debt increased by the purchase of Louisiana in 1803. |
| In 1809 | 56,732,379 | |
| In 1810 | 53,156,532 | Debt at its minimum in 1812. |
| In 1812 | 45,035,133 | |
| In 1813 | 55,907,452 | Debt increased by the war.—Maximum, 1816. |
| In 1816 | 123,016,375 | |
| In 1817 | 115,807,805 | Debt much reduced since 1816. |
| In 1820 | 91,015,566 | |
| In 1821 | 89,987,427 | Debt increased by the purchase of Florida and a diminution of the ordinary revenue. |
| In 1822 | 93,546,676 | |
| In 1823 | 90,375,877 | |
| In 1824 | 90,269,777 | |
| In 1825 | 83,788,432 | |
| In 1826 | 81,054,059 | Adams' administration from 1825, to 1829. |
| In 1827 | 73,987,357 | |
| In 1828 | 67,475,622 | |
| In 1829 | 58,362,135 | |
| In 1831 | 48,595,405 | Jackson's administration began March 4th, 1829. |

### BANK OF THE UNITED STATES.

The charter of the bank of the United States was granted 10th of April, 1816, for 20 years. Original capital, $35,000,000. Stock belonging to the United States government, $7,000,000. Parent Bank at Philadelphia. Offices of discount are established at the following places, viz. Portland, Portsmouth, Boston, Providence, Hartford, Burlington, New York, Utica, Buffalo, Baltimore, Washington, Richmond, Norfolk, Fayetteville, Charleston, Savannah, Mobile, Natchez, New Orleans, St. Louis, Nashville, Louisville, Lexington, Cincinnati, Pittsburgh.

*State of the Bank, September* 1, 1831.

| Investments. | | | Distribution. | | |
|---|---|---|---|---|---|
| Capital paid in | $35,000,000 | 00 | Funded Debt . | $3,517,381 | 6 |
| Circulation . | 22,399,447 | 52 | Loans . . | 56,895,451 | 9 |
| Public Deposits . | 7,252,249 | 42 | Mortgages . . | 140,956 | 63 |
| Private Deposits . | 9,115,836 | 47 | Chargeable to Contingent Fund . | 3,452,976 | 16 |
| Due to individuals in Europe . . | 168,372 | 72 | Real Estate . | 2,491,892 | 99 |
| Unclaimed Dividends | 251,766 | 3 | Due from offices and Banks . . | 621,523 | 8 |
| Contingent Fund | 5,613,173 | 15 | Expenses, &c. . | 259,383 | 50 |
| Discount, Exchange, and Interest . | 614,685 | 7 | Banking Houses . | 1,160,455 | 54 |
| Profit and Loss . | 1,750,048 | 51 | Notes of State Banks | 2,080,442 | 33 |
| | | | Specie . . | 11,545,116 | 51 |
| | $82,165,578 | 89 | | $82,165,578 | 89 |

STATISTICS.

***Value of Imports and Exports of the United States, during the year ending September 30, 1829, from and to each Foreign Country.***

| COUNTRIES. | Value of Imports. | Value of Exports. | | |
|---|---|---|---|---|
| | | Domestic Produce. | Foreign Produce. | Total. |
| Russia . . . . . . . . | $2,218,995 | $51,684 | $334,542 | $386,226 |
| Prussia . . . . . . . . | 22,935 | 14,411 | . . . . | 14,411 |
| Sweden and Norway . | 1,020,910 | 122,663 | 126,971 | 249,634 |
| Swedish West Indies . | 283,049 | 684,523 | 23,791 | 708,314 |
| Denmark . . . . . . | 32,911 | 73,597 | 13,166 | 86,763 |
| Danish West Indies . . | 2,053,266 | 1,942,010 | 282,401 | 2,224,411 |
| Netherlands . . . . . . | 1,057,854 | 3,095,857 | 889,330 | 3,985,187 |
| Dutch East Indies . . | 121,348 | 62,074 | 176,318 | 238,392 |
| Dutch West Indies . . | 438,132 | 379,874 | 18,667 | 398,541 |
| England . . . . . . . | 23,892,763 | 21,281,334 | 1,767,457 | 23,048,791 |
| Scotland . . . . . . . | 1,024,215 | 895,315 | 19,493 | 914,808 |
| Ireland . . . . . . . | 362,511 | 327,728 | 366 | 328,094 |
| Gibraltar . . . . . . | 247,471 | 301,132 | 160,130 | 461,262 |
| British East Indies . . | 1,229,569 | 69,070 | 477,629 | 546,699 |
| British West Indies . . | 240,224 | 1,463 | 5,058 | 6,521 |
| British Amer. Colonies . | 577,542 | 2,724,104 | 40,805 | 2,764,909 |
| Hanse Towns, &c. . . | 2,274,375 | 1,998,176 | 1,278,984 | 3,277,160 |
| France . . . . . . . | 8,838,978 | 8,895,045 | 2,854,350 | 11,749,395 |
| French West Indies . . | 777,992 | 1,056,639 | 15,768 | 1,072,407 |
| Bourbon . . . . . . . | . . . . | 10,502 | . . . . | 10,502 |
| Hayti . . . . . . . . | 1,799,809 | 814,987 | 160,171 | 975,158 |
| Spain . . . . . . . . | 803,529 | 731,605 | 185,432 | 917,137 |
| Teneriffe & other Can's. | 25,283 | 42,839 | 22,317 | 66,156 |
| Manilla & Philippine Is. | 209,206 | 10,802 | 66,430 | 77,232 |
| Cuba . . . . . . . . | 4,866,524 | 3,719,263 | 1,859,626 | 5,578,889 |
| Other Spanish W. Ind's. | 898,832 | 209,780 | 38,900 | 248,680 |
| Portugal . . . . . . . | 237,351 | 42,088 | 628 | 42,716 |
| Madeira . . . . . . . | 403,056 | 175,074 | 15,089 | 190,163 |
| Italy and Malta . . . | 1,409,588 | 289,755 | 611,257 | 901,012 |
| Trieste & other Ad'c. p'ts. | 191,896 | 409,288 | 280,200 | 689,488 |
| Turkey, Levant, Egypt . | 293,237 | 27,600 | 47,384 | 74,984 |
| Mexico . . . . . . . | 5,026,761 | 495,626 | 1,835,525 | 2,331,151 |
| Central Rep. of Amer. . | 311,931 | 123,631 | 116,223 | 239,854 |
| Honduras, Campeachy . | 64,847 | 12,693 | 8,229 | 20,922 |
| Colombia . . . . . . | 1,255,310 | 525,783 | 241,565 | 767,348 |
| Brazil . . . . . . . . | 2,534,467 | 1,510,260 | 419,767 | 1,929,927 |
| Argentine Republic . . | 912,114 | 444,716 | 181,336 | 626,052 |
| Chili . . . . . . . . | 416,118 | 890,356 | 530,778 | 1,421,134 |
| Peru . . . . . . . . | 1,004,458 | 91,542 | 119,615 | 211,157 |
| China . . . . . . . . | 4,680,847 | 260,759 | 1,094,103 | 1,354,862 |
| Other countries . . . . | 433,623 | 884,445 | 337,777 | 1,222,222 |
| Total . . . . . | 74,492,527 | 55,700,193 | 16,658,478 | 72,358,671 |

*Number of Troops, (Continental and Militia,) employed during the Revolution, and the Quotas furnished by each State.*

[From the Collections of the Hampshire Historical Society.]

| | 1775 | 1776 | | 1777 | | 1778 | | 1779 | | 1780 | | 1781 | | 1782 | 1783 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cont'l. | Cont'l. | Militia. | Cont'l. | Militi. | Cont'l. | Militi. | Cont'l. | Militi. | Cont'l. | Militi. | Cont'l. | Militi. | Cont'l. | Cont'l. |
| New-Hampshire, | 2824 | 3019 | | 1172 | 1111 | 1283 | | 1004 | 222 | 1017 | 760 | 700 | | 744 | 733 |
| Massachusetts, | 16444 | 13372 | 4000 | 7816 | 2775 | 7010 | 1927 | 6287 | 1451 | 4553 | 3436 | 3732 | 1566 | 4423 | 4370 |
| Rhode Island, | 2193 | 798 | 1102 | 548 | | 630 | 2426 | 507 | 756 | 915 | | 464 | | 481 | 372 |
| Connecticut, | 4507 | 6390 | 5737 | 4563 | | 4010 | | 3544 | | 3133 | 554 | 2420 | 1501 | 1732 | 1740 |
| New-York, | 2075 | 3629 | 1715 | 1903 | 921 | 2194 | | 2256 | | 2179 | 668 | 1728 | | 1198 | 1169 |
| New-Jersey, | | 3193 | 5893 | 1408 | | 1586 | | 1276 | | 1105 | 162 | 823 | | 660 | 675 |
| Pennsylvania, | 400 | 5519 | 4876 | 4983 | 2481 | 3684 | | 3476 | | 3337 | | 1346 | | 1265 | 1598 |
| Delaware, | | 609 | 145 | 229 | | 349 | | 317 | | 325 | 231 | 89 | | 164 | 235 |
| Maryland, | | 637 | 2592 | 2030 | 1535 | 3307 | | 2849 | | 2065 | | 770 | | 1280 | 974 |
| Virginia, | | 6181 | | 5744 | 1289 | 5236 | | 3973 | | 2486 | | 1215 | 4331 | 1204 | 629 |
| North Carolina, | | 1134 | | 1281 | | 1287 | | 1214 | | | | 545 | | 1105 | 697 |
| South Carolina, | | 2069 | | 1650 | | 1650 | | 909 | | | | | | | 139 |
| Georgia, | | 351 | | 1423 | | 673 | | 87 | | | | | | | 145 |
| | 23443 | 46901 | 26060 | 34750 | 10112 | 32899 | 4353 | 27699 | 2429 | 21115 | 5811 | 13832 | 7398 | 14256 | 13076 |

Total, { Continental, . . . 231,971
{ Militia, . . . 56,163

STATISTICS.

*Statement of the Value of Domestic Exports of the United States in the year ending September 30th, 1829.*

| | | | |
|---|---|---|---|
| THE SEA. | | | |
| *Fisheries.—* | | | |
| Dried fish, or cod fisheries. | | $747,541 | |
| Pickled fish, or river fisheries, herring, shad, salmon, mackerel. | | 220,527 | |
| Whale (common) oil, whale bone. | | 495,163 | |
| Spermaceti oil and candles. | | 353,869 | |
| | | | $1,817,100 |
| THE FOREST. | | | |
| Skins and furs . . | | 526,507 | |
| Ginseng . . . | | 114,396 | |
| *Product of Wood.—* | | | |
| Staves, shingles, boards | $1,680,403 | | |
| Oak bark and other dye | 165,406 | | |
| Naval stores, tar, pitch, rosin and turpentine | 377,613 | | |
| Ashes, Pot and Pearl | 817,434 | | |
| | | 3,040,856 | |
| AGRICULTURE. | | | 3,681,759 |
| *Product of Animals.* | | | |
| Beef, tallow, hides and h'd cattle | 674,955 | | |
| Butter and cheese . . | 176,205 | | |
| Pork (pkl'd,) bacon, lard, live hogs | 1,493,629 | | |
| Horses and mules . . | 207,858 | | |
| Sheep . . . | 10,644 | | |
| *Vegetable Food.—* | | 2,563,291 | |
| Wheat, flour, and biscuit | 5,972,920 | | |
| Indian corn and meal : | 974,535 | | |
| Rye meal . . . | 127,004 | | |
| Rye, oats, and other small grain and pulse . . | 74,896 | | |
| Potatos . . . | 30,079 | | |
| Apples . . . | 15,958 | | |
| Rice . . . | 2,514,370 | | |
| | | 9,709,762 | |
| | | | 12,273,053 |
| Tobacco . . . | | | 4,982,947 |
| Cotton . . . | | | 26,575,311 |
| *All other agricultural products.—* | | | |
| Flaxseed . . . | | 113,040 | |
| Hops . . . | | 6,917 | |
| Brown Sugar . . | | 3,289 | |
| MANUFACTURES. | | | 123,246 |
| Soap and tallow candles . | | 692,691 | |
| Leather, boots and shoes . | | 356,658 | |
| Saddlery . . . | | 35,765 | |
| Hats . . . . | | 270,780 | |
| Wax . . . . . | | 132,939 | |
| Spt's, from grain, beer, ale, & porter | | 215,494 | |
| Wood (including coaches and other carriages) | | 501,946 | |

STATISTICS.

| | | | |
|---|---|---|---|
| Snuff and tobacco . . . . | | $202,396 | |
| Lead . . . . . | | 8,417 | |
| Linseed oil and spirits of turpentine | | 30,442 | |
| Cordage . . . . | | 7,984 | |
| Iron . . . . . | | 22[illegible]05 | |
| Spirits from molasses . | | [illegible]40 | |
| Sugar refined . . . . | | 50,739 | |
| Chocolate . . . . | | 1,759 | |
| Gunpowder . . . . | | 171,924 | |
| Copper and brass . . . | | 129,647 | |
| Medicinal drugs . . . . | | 101,524 | |
| | | | $3,301,559 |
| *Cotton and piece goods.—* | | | |
| Printed and colored . . | 145,025 | | |
| White . . . . | 981,370 | | |
| Nankeens . . . . | 1,878 | | |
| Twist, yarn, and thread . | 3,849 | | |
| All other manufactures of, . | 127,336 | | |
| *Flax and hemp.—* . . . | | 1,259,457 | |
| Cloth and thread . . . | | 2,166 | |
| Bags, and all manufactures of | | 14,954 | |
| Wearing apparel . . . | | 91,108 | |
| Combs, and buttons . . . | | 76,250 | |
| Brushes . . . . | | 3,150 | |
| Billiard tables and apparatus . | | 3,443 | |
| Umbrellas and parasols . | | 22,067 | |
| Leather and Morocco skins not sold, per pound . . | | 80,173 | |
| Fire engines and apparatus . | | 2,832 | |
| Printing presses and types . | | 12,908 | |
| Musical instruments . | | 8,868 | |
| Books and maps . . . | | 29,010 | |
| Paper and other stationary . | | 25,629 | |
| Paints and varnish . . . | | 21,133 | |
| Vinegar . . . . | | 5,953 | |
| Earthen and stone ware . . | | 5,592 | |
| Manufactures of glass . | | 49,900 | |
| Do. tin . . . . | | 1,757 | |
| Do. pewter and lead . | | 5,185 | |
| Do. marble and stone . | | 2,647 | |
| Do. gold and silver and gold leaf | | 11,250 | |
| Gold and silver coin . . | | 612,886 | |
| Artificial flowers and jewelry | | 21,627 | |
| Molasses . . . . | | 1,992 | |
| Trunks . . . . | | 11,248 | |
| Brick and lime . . . | | 3,717 | |
| Salt . . . . . | | 26,648 | |
| *Articles not distinguished in returns.* | | | 2,414,550 |
| Manufactured . . . | | 309,100 | |
| Raw produce . . . | | 221,544 | 530,650 |
| | | Total | 55,700,193 |

## STATISTICS.

### TOTAL POPULATION OF THE EARTH.

The population of the Earth, together with the geographical square miles, by the most recent and respectable authorities, is as follows:

| | *Surface.* | *Inhabitants.* |
|---|---|---|
| Europe . . . | 2,793,000 | 227,700,000 |
| Asia . . . | 12,118,000 | 390,000,000 |
| Africa . . . | 8,516,000 | 60,000,000 |
| America . . . | 11,046,000 | 39,000,000 |
| Australasia . . | 3,100,000 | 20,300,000 |
| Total | 27,573,000 | 737,000,000 |

### INHABITANTS OF THE EARTH DIVIDED ACCORDING TO THEIR RELIGIOUS BELIEF.

The two following estimates are according to the geographers Malte-Brun and Hassel.

| | *Malte-Brun.* | *Hassel.* |
|---|---|---|
| Catholics . . | 116,000,000 | 134,000,000 |
| Greek Church . . | 70,000,000 | 62,000,000 |
| Protestants . . | 42,000,000 | 55,000,000 |
| Total of Christians | 228,000,000 | 251,000,000 |
| Jews . . . | 4,000,000 | 3,000,000 |
| Mohometans . . | 100,000,000 | 120,000,000 |
| Pagans . . | 310,000,000 | 550,000,000 |
| Total inhabitants of the Globe | 642,000,000 | 924,000,000 |

### SUCCESSIVE ADMINISTRATIONS IN THE UNITED STATES.

FIRST ADMINISTRATION;—1789 to 1797; 8 years.

| | | | |
|---|---|---|---|
| GEORGE WASHINGTON, | Virginia, | April 30, 1789. | President. |
| John Adams, | Massachusetts, | April 30, 1789. | Vice President. |
| | | *Appointed* | |
| Thomas Jefferson, | Virginia, | Sept. 26, 1789. | Secretaries of State |
| Edmund Randolph, | do. | Jan. 2, 1794. | |
| Timothy Pickering, | Pennsylvania, | Dec. 10, 1795. | |
| Alexander Hamilton, | New York, | Sept. 11, 1789. | Secretaries of the Treasury. |
| Oliver Wolcott, | Connecticut, | Feb. 3, 1795. | |
| Henry Knox, | Massachusetts, | Sept. 12, 1789. | Secretaries of War |
| Timothy Pickering, | Pennsylvania, | Jan. 2, 1795. | |
| James M'Henry, | Maryland, | Jan. 27, 1796. | |
| Samuel Osgood, | Massachusetts, | Sept. 26, 1789. | Post Masters General. |
| Timothy Pickering, | Pennsylvania, | Nov. 7, 1791. | |
| Joseph Habersham, | Georgia, | Feb. 25, 1795. | |
| Edmund Randolph, | Virginia, | Sept. 26, 1789. | Attornies General |
| William Bradford, | Pennsylvania, | Jan. 27, 1794. | |
| Charles Lee, | Virginia, | Dec. 10, 1795. | |

SECOND ADMINISTRATION;—1797 to 1801; 4 years.

| | | | |
|---|---|---|---|
| John Adams, | Massachusetts, | March 4, 1797. | President. |
| Thomas Jefferson, | Virginia, | March 4, 1797. | Vice President. |
| | | *Appointed* | |
| Timothy Pickering, | Pennsylvania, | *continued in office* | Secretaries of State |
| John Marshall, | Virginia, | May 13, 1800. | |
| Oliver Wolcott, | Connecticut, | *continued in office* | Secretaries of the Treasury. |
| Samuel Dexter, | Massachusetts, | Dec. 31, 1800. | |

STATISTICS.

| | | | |
|---|---|---|---|
| James M'Henry, | Maryland, | *(continued in office,)* | Secretaries of War. |
| Samuel Dexter, | Massachusetts, | May 13, 1800, | |
| Roger Griswold, | Connecticut, | Feb. 3, 1801, | |
| George Cabot,* | Massachusetts, | May 3, 1798, | Secretaries of the Navy. |
| Benjamin Stoddert, | Maryland, | May 21, 1798, | |
| Joseph Habersham, | Georgia, | *(continued in office,)* | Post Master General. |
| Charles Lee, | Virginia, | *(continued in office,)* | Attorney General. |

THIRD ADMINISTRATION;—1801 to 1809;—8 years.

| | | | |
|---|---|---|---|
| Thomas Jefferson, | Virginia, | March 4, 1801, | President. |
| Aaron Burr, | New York, | March 4, 1801, | Vice Presidents. |
| George Clinton, | New York, | March 4, 1805, | |
| | | *Appointed.* | |
| James Madison, | Virginia, | March 5, 1801, | Secretary of State. |
| Samuel Dexter, | Mass. | *(continued in office,)* | Secretaries of the Treasury. |
| Albert Gallatin, | Pennsylvania, | Jan 26, 1802, | |
| Henry Dearborn, | Massachusetts, | March 5, 1801, | Secretary of War. |
| Benjamin Stoddert, | Maryland, | *(continued in office,)* | Secretaries of the Navy. |
| Robert Smith,† | Maryland, | Jan 26, 1802, | |
| Joseph Habersham, | Georgia, | *(continued in office.)* | Post Masters General. |
| Gideon Granger, | Connecticut, | Jan. 26, 1802, | |
| Levi Lincoln, | Massachusetts, | March 5, 1801, | Attorneys General. |
| John Breckenridge, | Kentucky, | Dec. 23, 1805, | |
| Cæsar A Rodney, | Delaware, | Jan. 20, 1807, | |

FOURTH ADMINISTRATION;—1809 to 1817;—8 years.

| | | | |
|---|---|---|---|
| James Madison, | Virginia, | March 4, 1809, | President. |
| George Clinton, | N. Y. 1809, | *(died April 20, 1812,)* | Vice Presidents. |
| Elbridge Gerry, | Mass. 1813, | *(died Nov. 23, 1814,)* | |
| | | *Appointed.* | |
| Robert Smith, | Maryland, | March 6, 1809, | Secretaries of State. |
| James Monroe, | Virginia, | Nov. 25, 1811, | |
| James Monroe,‡ | Virginia, | Feb. 28, 1815, | |
| Albert Gallatin, | Pennsylvania, | *(continued in office,)* | Secretaries of the Treasury. |
| George W. Campbell, | Tennessee, | Feb. 9, 1814, | |
| Alexander J. Dallas, | Pennsylvania, | Oct. 6, 1814, | |
| William Eustis, | Massachusetts, | March 7, 1809, | Secretaries of War. |
| John Armstrong, | New-York, | Jan. 13, 1813, | |
| James Monroe, | Virginia, | Sept. 27, 1814, | |
| William H. Crawford, | Georgia, | March 2, 1815, | |
| Paul Hamilton, | South Carolina, | March 7, 1809, | Secretaries of the Navy. |
| William Jones, | Pennsylvania, | Jan. 12, 1813, | |
| Benj. W. Crowninshield, | Massachusetts, | Dec. 19, 1814, | |
| Gideon Granger, | Connecticut, | *(continued in office,)* | Post Masters General. |
| Return J. Meigs, | Ohio, | March 17, 1814, | |
| Cæsar A. Rodney, | Delaware, | *(continued in office)* | Attorneys General. |
| William Pinkney, | Maryland, | Dec. 11, 1811, | |
| Richard Rush, | Pennsylvania, | Feb. 10, 1814, | |

FIFTH ADMINISTRATION;—1817 to 1825;—8 years.

| | | | |
|---|---|---|---|
| James Monroe, | Virginia, | March 4, 1817, | President. |
| Daniel D. Tompkins, | New-York, | March 4, 1817, | Vice President. |
| | | *Appointed.* | |
| John Q. Adams, | Massachusetts, | March 5, 1817, | Secretary of State. |
| William H. Crawford, | Georgia, | March 5, 1817, | Secretary of Treasury. |
| Isaac Shelby,§ | Kentucky, | March 5, 1817, | Secretaries of War. |
| John C. Calhoun, | South Carolina, | Dec. 16, 1817, | |
| Benj. W. Crowninshield, | Mass. | *(continued in office,)* | Secretaries of the Navy. |
| Smith Thompson, | New-York, | Nov. 30, 1818, | |
| Samuel L. Southard, | New-Jersey, | Dec. 9, 1823, | |

* Mr. Cabot declined the appointment. The navy department was established in 1798.

† Robert Smith was appointed Attorney General, and Jacob Crowninshield of Massachusetts, Secretary of the Navy, on the 2d of March, 1805, but they both declined these appointments; and Mr. Smith continued in the office of Secretary of the Navy, till the end of Mr. Jefferson's administration.

‡ James Monroe was re-commissioned, having for some time acted as Secretary of War.

§ Isaac Shelby declined the appointment.

STATISTICS.

| | | | |
|---|---|---|---|
| Return J. Meigs, | Ohio, | (*continued in office,*) | Post Masters General. |
| John McLean, | Ohio, | Dec. 9, 1823, | |
| Richard Rush, | Pennsylvania, | (*continued in office,*) | Attorneys General. |
| William Wirt, | Virginia, | Dec. 16, 1817, | |

SIXTH ADMINISTRATION;—1825 to 1829;—4 years.

| | | | |
|---|---|---|---|
| John Q. Adams, | Massachusetts, | March 4, 1825, | President. |
| John C. Calhoun, | South Carolina, | March 4, 1825, | Vice President. |
| | | *Appointed.* | |
| Henry Clay, | Kentucky, | March 8, 1825, | Secretary of State. |
| Richard Rush, | Pennsylvania, | March 7, 1825, | Secretary of Treasury. |
| James Barbour, | Virginia, | March 7, 1825, | Secretaries of War. |
| Peter B. Porter, | New York, | May 26, 1828, | |
| Samuel L. Southard, | New Jersey, | (*continued in office,*) | Secretary of Navy. |
| John McLean, | Ohio, | (*continued in office,*) | Post Master General. |
| William Wirt, | Virginia, | (*continued in office,*) | Attorney General. |

SEVENTH ADMINISTRATION;—1829—

| | | | |
|---|---|---|---|
| Andrew Jackson, | Tennessee, | March 4, 1829, | President. |
| John C. Calhoun, | South Carolina, | March 4, 1829, | Vice President. |
| | | *Appointed.* | |
| Martin Van Buren, | New York, | March 6, 1829, | Secretaries of State. |
| Edward P. Livingston, | Louisiana, | May 25, 1831, | |
| Samuel D. Ingham, | Pennsylvania, | March 6, 1829, | Secretaries of Treas. |
| Louis McLane, | Delaware, | May 25, 1831, | |
| John H. Eaton, | Tennessee, | March 9, 1829, | Secretaries of War. |
| Lewis Cass, | Michigan, | May 25, 1831, | |
| John Branch, | North Carolina, | March 9, 1829, | Secretaries of Navy. |
| Levi Woodbury, | New Hampshire, | May 25, 1831, | |
| William T. Barry, | Kentucky, | March 9, 1829, | Post Master General. |
| John McP. Berrien, | Georgia, | March 9, 1829, | Attorneys General. |
| Roger B. Taney, | Maryland, | July 13, 1831, | |

EIGHTH ADMINISTRATION;—1833—

| | | | |
|---|---|---|---|
| Andrew Jackson, | Tennessee, | March 4, 1833, | President. |
| Martin Van Buren, | New York, | March 4, 1833, | Vice President. |
| | | *Appointed.* | |
| Edward P. Livingston, | Louisiana, | (*continued in office,*) | Secretaries of State. |
| Louis McLean, | Delaware, | July, 1833, | |
| John Forsyth, | Georgia, | June, 1834, | |
| Louis McLean, | Delaware, | (*continued in office,*) | Secretaries of the Treasury. |
| William J. Duane, | Pennsylvania, | July, 1833, | |
| Roger B. Taney, | Maryland, | October, 1833, | |
| Levi Woodbury, | New Hampshire, | June, 1834, | |
| Lewis Cass, | Michigan, | (*continued in office,*) | Secretary of War. |
| Levi Woodbury, | N. Hampshire, | (*continued in office,*) | Secretaries of the Navy. |
| Mahlon Dickerson, | New Jersey, | June, 1834, | |
| Roger B. Taney, | Maryland, | (*continued in office,*) | Attorneys General. |
| Benjamin F. Butler, | New York, | October, 1833, | |